NOVEMBER, 1942

Orthodontics

EDITOR-IN-CHIEF
H. C. POLLOCK

ASSOCIATE EDITORS

Oren A. Oliver James D. McCoy Charles R. Baker Joseph D. Eby
Paul G. Spencer Richard E. Barnes Henry F. Hoffman

CONSULTING EDITOR, DENTISTRY FOR CHILDREN
Walter T. McFall

ABSTRACTS AND REVIEWS
Associate Editor, J. A. Salzmann

Office of the Editor: 8022 Forsythe Boulevard, St. Louis
Published by The C. V. Mosby Company, St. Louis

American
Journal of Orthodontics
and Oral Surgery
(All rights reserved)

VOL. 28 NOVEMBER, 1942 No. 11

Symposium

The Treatment of Dentofacial Anomalies Having the Following Predominating Characteristics: (A) Both Dental Arches More Narrow Than Normal; (B) Protruding Upper Incisors, With All of the Lower Teeth Occupying a Posterior Malrelationship to the Upper, With the Mandibular Structures Markedly Arrested in Development; (C) Bimaxillary Supraversion of the Incisors, With the Lowers in Contact With the Upper Gingival Tissues*

A CONTRIBUTION TO THE SYMPOSIUM

JAMES DAVID MCCOY, D.D.S., LOS ANGELES, CALIF.

A CAREFUL reading of the title of this symposium will reveal the fact that it constitutes an almost complete diagnostic appraisal of one of the most frequently occurring dentofacial anomalies. If we add the status of the oral and facial muscles which, in most instances, will be found to be lacking in tone and exhibiting varying degrees of malfunction, the clinical picture is complete for all practical purposes. That such cases are encountered frequently, and are similar in their general characteristics, is evident, both to the orthodontist and the observing layman. This is rendered emphatic by the study of Fig. 1. Few other general types, if any, exceed this one in the extent to which normal anatomic and functional relationships are disturbed and disrupted. For this reason, the benefits of treatment, if successful, are so far-reaching that they may be considered among the greatest achievements of dentofacial orthopedics.

Read before the American Association of Orthodontists and the Inter-American Orthodontic Congress, New Orleans, La., March, 1942.

*This symposium consists of the five papers which are presented in this issue.

Fig. 1.—A group of cases, any one of which can be accurately described by the title of the symposium.

Fortunately prognosis in such cases is favorable within certain limits, but restricted and conditioned by influences, some of which lie outside the clinical efforts of the orthodontist. One of the first of these which must be considered is concerned with the etiologic factors responsible for the deformity. If still in effect, the cooperation of the patient and the support of parents are necessary to their elimination. These essential agencies apply to other phases of treatment, which will be alluded to later. The degree to which causes may be operative frequently depends upon the age of the patient, for it is quite possible that in those cases encountered in the postchildhood period, active causative influences will have subsided. It is important at the outset, however, regardless of the age or status of the anomaly, to establish or see that there is established general metabolic balance so that patients will be favorable orthodontic risks. In this task, an interested and cooperative pediatrician can give indispensable assistance.

Concurrent with these considerations, and as one of the most important qualifying circumstances of prognosis, we must consider heredity, for this potent force in all organic life establishes limits beyond which we cannot go. All evidence upon this subject points to the fact that heredity determines how far an organism can develop, while environmental influences determine whether it will ever get there. The proper utilization of these last-mentioned factors, however, provides an armamentarium of vast usefulness to the orthodontist, for when properly and skillfully applied, they are both effective and essential. In fact, one of our most capable observers in the field of growth and development is responsible for the declaration that "the human organism rarely ever achieves the limits established by heredity." This statement may be received both with comfort and with a sense of added responsibility on the part of the orthodontist, and should likewise receive consideration by patients, if and when they are willing to take the orthodontic problem seriously.

Among the environmental influences not yet mentioned, we must include those functional forces directly related to the dentofacial area. These are varied and include not only the teeth and their supporting osseous structures, but also groups of muscles, both intraoral and extraoral, which contribute to and play a part in the varied activities of the facial ensemble, such as respiration, swallowing, such emotional responses as smiling, and others of importance. When we bear in mind the fact that prior to treatment, most of these functions are disrupted, and that malfunction has replaced normal function, their importance is impressive. It would appear, therefore, that as a measure of paramount necessity, the more promptly normal function is made possible in all of these parts, the more quickly will growth responses, favorable in character, take place. In fact, the amount of supplemental growth which occurs following the establishment of the teeth, dental arches, and jaws within the normal functional range, frequently spells the difference between complete success and partial success.

This brings to the fore a consideration of the age period most suitable for the inauguration of treatment. It is comparatively rare that the orthodontist is given the opportunity to decide this question, for he must render aid when the opportunity is offered. My own feeling is that such cases should be started during that period of life when the first permanent molars and the maxillary

and mandibular incisors have erupted. Perhaps upon the average this would be about the eighth or ninth year. With these teeth present, a favorable anchorage situation is available to provide for the prompt correction of dentofacial malrelationships, at least to the point of bringing them within what has been referred to as the normal functional range. When this is accomplished, and with skillful, though less rigorous post-treatment care, important elements for success are established.

If such environmental requirements as metabolic balance, and the elimination of causes within the control of the patient have been realized, structural responses are usually prompt and gratifying. At this period of treatment, we may visualize in an impressive manner, the operation of Wolff's law, which in brief is, "with every alteration of function, there is alteration of structure"; or, stated otherwise, "growth occurs where there is a need for it." In addition to the stimulus provided by appliances, the muscles with their altered functional pull and stimulus-giving action, as well as the inherent possibilities of bone growth within the mandible, give feasible evidence of the effectiveness of this principle. To the clinician who carefully records his cases at intervals of treatment with both denture and facial records, these changes more readily become apparent. If such records are to reveal significant facts, they must be made in such a manner that the orientation of the denture to the face is made evident. Furthermore, they should show, in addition to the usual dental relationships, true angles of tooth inclination, the pitch of the occlusal plane, symmetric or asymmetric states of growth, intraorally and extraorally.

In view of the problems involved in the treatment of any dysgnathic anomaly, and especially the distinctive type under discussion, the selection and application of appliance therapy are matters of major importance. Our diagnosis, briefly outlined in the title of this symposium, lays down the requirements. In meeting them, an endeavor is made to utilize the most simple means which can be employed without sacrificing the all-important factor of control. A review of the title shows the necessity of (a) restoring normal arch form, (b) establishing normal anteroposterior relationships, (c) overcoming vertical malrelationships necessary to establish dental function of advantage, and (d) inducing growth changes of advantage, especially in the mandible.

In meeting these varied problems, the routine treatment utilized by the author for many years has been to employ a round labial arch wire upon the upper teeth, and a removable lingual arch wire upon the lower teeth. These are shown in Figs. 2 and 3, in conjunction with the case where they are to be utilized. With each of these, certain auxiliaries are put into use. Bands are provided for the four maxillary incisors, and such additional teeth as may be necessary to proper control, depending upon the state of dentition of the patient, and these bands carry upon their labial surfaces open tubes into which the labial arch wire is locked. This gives a nonrigid, but controlled form of attachment. The labial arch wire is made in three segments, the frontal two-thirds of it being 0.030 of an inch in diameter, while the end sections, which engage the buccal tubings upon the anchor teeth, are 0.038 of an inch in diameter. The reason for the end sections of greater diameter will be explained later. The material is a gold platinum alloy, and the sections are joined together by solder-

ing. Any necessary auxiliaries are soldered to it, such as hooks for intermaxillary elastics, vertical pins, auxiliary springs for the control of individual teeth, "stops," and coil springs to serve as stops, or to provide the production of force. These are all pictured in Fig. 4.

The removable lingual arch wire is of the usual type, except that one or more frontal teeth (usually the cuspids), are banded as a means of stabilizing the appliance. It is constructed of gold platinum alloy, the wire being 0.038 of an inch in diameter. The usual auxiliary springs, of small diameter, are employed where necessary to provide individual or group tooth movements. The arrangement is shown also in Fig. 3.

Fig. 2.—An average case frequently encountered. The patient is a boy 11 years and 8 months of age.

In order to show the application of appliances, the treatment of a case will be reported. This falls within the diagnostic category outlined by our title, is just an average case, and because of this fact, is selected for purposes

of demonstration. The arrangement already described in connection with the labial arch wire was applied to the maxillary teeth, bands being placed upon the first permanent molars, and upon the four upper incisors. The removable lingual arch wire was applied to the mandibular teeth, the first permanent molars being utilized for primary anchorage, and the right lower canine as a means of providing stability. In Fig. 5, all appliances are shown in conjunction with other significant records. The labial arch wire was adapted in a passive state, and soldered stops were placed to control its position in the buccal

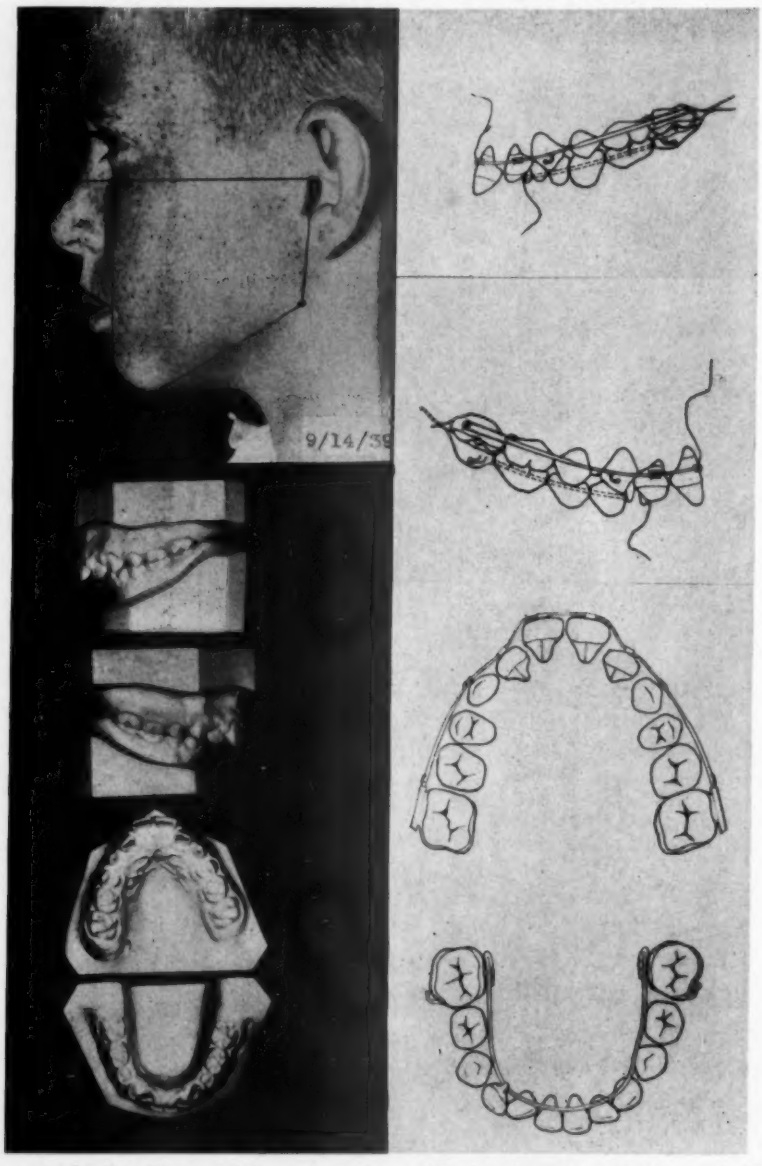


Fig. 3.—The case to be discussed in connection with treatment methods, and the appliance to be utilized.

tubings upon the upper teeth. At the first adjustment, it was altered to more nearly approach normal dental arch form, in which relationship it stood slightly away from the lateral incisors, and the stops occupied a slightly forward relationship to the molar buccal tubes. It was then locked in place upon the incisor

teeth and ligated against the buccal tubings through the medium of the stops. The action, therefore, was to move the central incisors posteriorly, and the lateral incisors slightly forward. Subsequent adjustments soon brought about a desirable alignment of the incisors, after which slight bends were put in the arch wire just anterior to the buccal tubings so that force could be directed in an upward direction. In conjunction with these same adjustments, bends in a horizontal direction were made in the arch wire at the points where the stops were soldered to rotate to a small degree the first permanent molars. In this action the mesiobuccal cusps are carried buccally, and the distolingual cusps lingually, just as if their mesiolingual roots could be used as an axis upon which the teeth could be turned. The rotation of the molars usually carries them in a posterior direction to some extent. Where our diagnostic findings show the necessity of continuing this movement, coil springs are used in conjunction with intermaxillary traction, as illustrated in Fig. 4. It is in carrying out these last two mentioned applications of force that the end sections of larger diameter are especially potent. In addition, they offer a stability to the arch wire which is a protection.

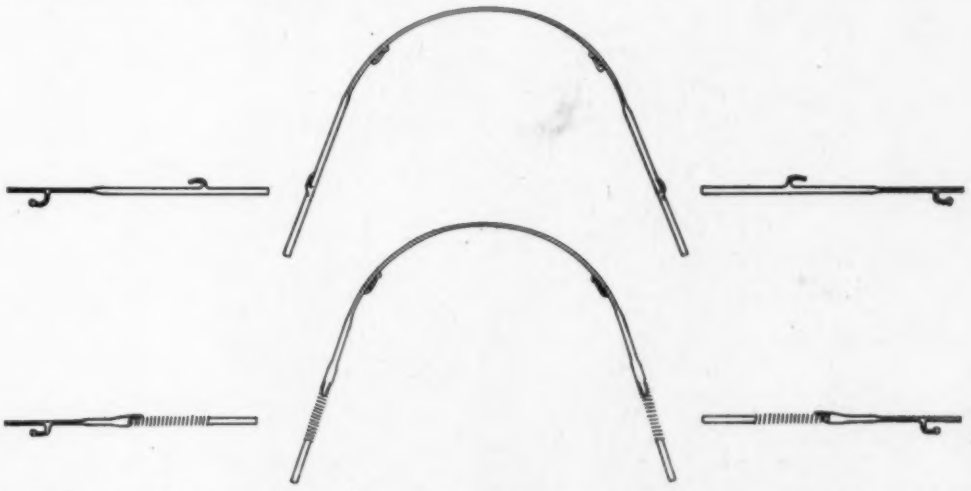


Fig. 4.—Labial arch wires, showing the end sections, 0.038 of an inch in diameter, and central working portions, 0.030 of an inch in diameter. In one instance an ordinary "stop" is employed, while in the other, coil springs, protected by a special attachment, serve the purpose of length control, as well as force control.

Coincident with these movements in the upper dental arch, changes of necessity were carried out in the lower dental arch, these being an increased width in the frontal segment which included the eight anterior teeth. All these changes, including the rotation of the lateral incisors, were accomplished with auxiliary springs. With these objectives completed, the removable lingual arch wire was readapted to engage all of the teeth and firmly stabilized in preparation for the application of intermaxillary traction. Upon several occasions slight vertical bends in a downward direction were made just anterior to the molar attachments, this action having as its effect the depression of the frontal segment and the elevation of the molars. This aided in establishing an incisogingival relationship of advantage, as well as the other adaptive growth changes essential to a normal occlusal plane.

With upper and lower normal arch form approximated, and with the maxillary molars rotated so that the lower dental arch could be moved forward into a harmonious relationship with the upper, intermaxillary traction was applied. For this purpose, strong intermaxillary rubber bands were employed and worn day and night, their action being designed to cause the patient to move the mandible forward to escape the pressure. In fact, under such conditions, the patient practiced myofunctional therapy, and as soon as the dental arches could be held together harmoniously, the instruction was given to indulge

Fig. 5.—A sequence of facial records and the appliances at different stages of treatment.

in the repetition of this position as much as possible. We had, therefore, in effect, altered dental and muscular function, and other influences favorable to those growth changes in the mandible which our diagnosis had revealed as needed. That this supplemental growth took place is shown by the sequence of records employed to report this case. These are shown in Figs. 6, 7, and 8.

In describing the appliances utilized for control, emphasis is laid upon the fact that, when necessary, bands or other auxiliaries are extended to other teeth than those illustrated by this case. In this instance, it was not required,

Fig. 6.—A series of denture and facial records used to record treatment progress.

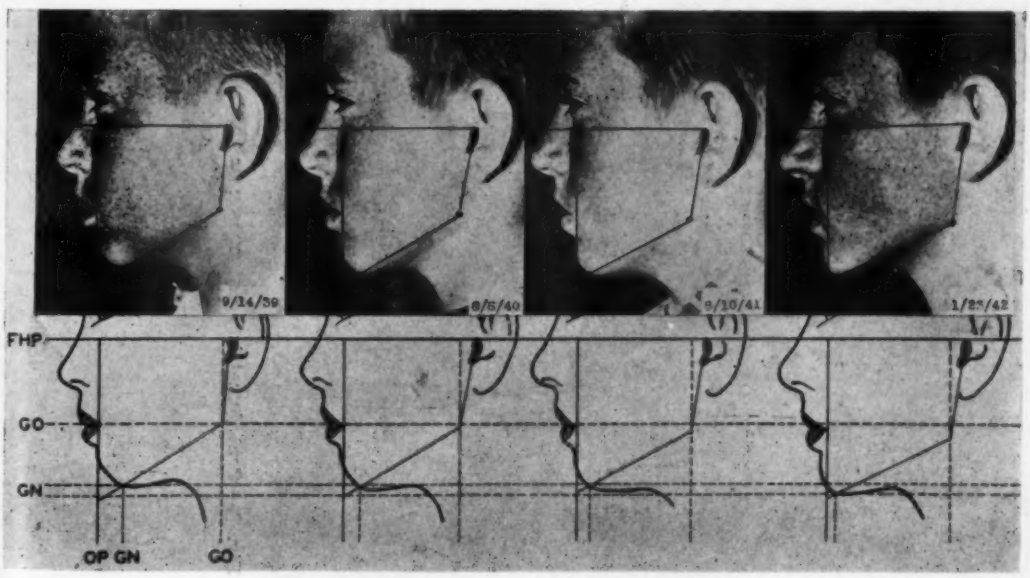


Fig. 7.—Accurate tracings made of the photostatic facial records to demonstrate dentofacial growth changes.

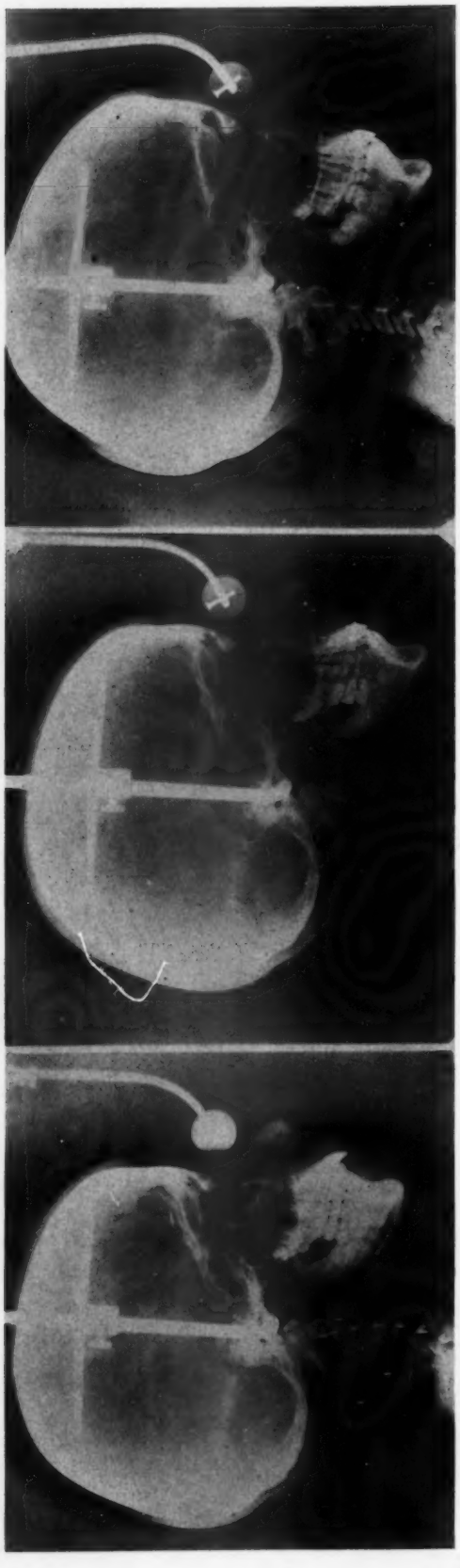


Fig. 8.—Cephalometric roentgenograms made at three stages. It will be noted that these supplement and confirm the photostatic records.

for the teeth in the lateral portions of the dental arches while erupting assumed favorable positions, both horizontally and vertically, without difficulty, the influence of the tongue no doubt having its effect upon the maxillary canines and bicuspids. Within six months, the teeth, dental arches and jaws were in function, and favorable growth in the mandible was discernible. Intermaxillary elastics at this point were worn at night only, and in approximately a year's time were discontinued entirely. The period of active treatment was naturally shortened by the patient's faithful cooperation. Without this, it is conceivable that an indefinite period for success might easily have been necessary.

With the completed eruption of the cuspid and bicuspid groups, fixed appliances were removed from the upper teeth, and a Hawley appliance was installed, this being provided with a shelf to control incisogingival relationships. Upon the lower teeth a cuspid-to-cuspid retainer was employed. Exercises were prescribed to tone up and retrain the temporal, masseter, and pterygoid groups of muscles, these being taken with the Hawley appliance in place, and an additional exercise for the orbicularis oris and its associated groups, this being practiced without the appliance. In order to encourage normal lip function, the patient was instructed to keep a card between the lips during study periods, so that if they fell apart he would be conscious of his omission.

At the present time, facial muscles show such improvement that it might be safe to do away with the nightly wearing of the Hawley appliance, but in view of the fact that the second molars are somewhat slow in erupting, it will be continued until they are in place. The cuspid-to-cuspid retainer will be utilized until the mandibular third molars have either made an orderly eruption, or have been removed. Roentgenographic surveys made periodically at four different times during treatment indicate a favorable completion of the denture.

In concluding this contribution to the symposium, emphasis is laid upon the following necessities for successful treatment: (1) An accurate differential diagnosis which reveals all parts of the facial ensemble contributing to the anomaly; (2) The establishment of normal metabolic balance so that patients may be good orthodontic risks; (3) The elimination of any causative factors still in effect; (4) Due consideration of hereditary factors in prognosis; (5) The complete utilization of environmental forces of advantage, including a favorable age period; (6) The sustained cooperative effort of the patient; (7) An appliance therapy which is as simple as possible, and yet meets the all important requisite of control so the most essential of all environmental forces for growth may be put promptly in effect, i.e., normal function.

THE SUCCESSFUL TREATMENT OF A CASE OF BILATERAL DISTOCLUSION, USING THE LABIO-LINGUAL TECHNIQUE

RUSSELL E. IRISH, B.S., M.A., D.D.S., PITTSBURGH, PA.

IT IS said that Gray required twenty years to complete his *Elegy*.

Each of those taking part in this symposium have been allotted one-half hour to cover a comprehensive subject. This, of course, cannot be done in the allotted time.

My written expressions I shall give in abstract; spoken remarks with accompanying slides, I shall try to make instructive and as comprehensive as possible.

Synopsis of the Case in Question.—Bilateral distoclusion, with lack of lateral growth of the maxilla, *retarded* growth of the mandible, dental malfunction, anteversion of the maxillary incisors, mandibular incisors in supraversion and contacting the upper gingival tissue, mutilation due to the loss of one molar, *arrested* development.

Etiologic Factors.—Faulty metabolism, enlarged infected tonsils, adenoid tissue, mouth breathing, glandular imbalance.

The predisposing causes mentioned, by their presence, become the active causes, thus producing the immediate condition. Their correction and adjustment followed in proper sequence by correct medical and orthodontic intervention.

Case History.—Other than those mentioned under the heading "etiologic factors" and in the synopsis, there were no other factors of note.

The age of the patient was seventeen years.

The method of treatment was the labio-lingual technique.

One set of appliances was used throughout treatment.

The upper set of appliances consisted of a lingual appliance with an occlusal guide plane, and the necessary auxiliary springs and attachments, which were: right and left, horizontal posterior-recurved posterior auxiliary springs extending to and engaging the cuspids. Also there were inclined curved auxiliary attachments, attached to the appliance and contacting the lingual surface of the cuspids, extending incisally. Such attachments are rests and prevent the appliance from seating too far gingivally, thus eliminating gingival irritation.

A medium high labial appliance was used, on which were placed perpendicular auxiliary springs, engaging the central and lateral incisors, and centered mesiodistally. Medium long intermaxillary hooks were also a part of the appliance; they were placed in the cuspid region. Also, there were loop springs placed on the upper surface of the appliance and contacting the anterior surface of the horizontally placed round buccal tubes.

Read before the American Association of Orthodontists and the Inter-American Orthodontic Congress, New Orleans, La., March, 1942.

Lower Appliances.—The lingual appliance had horizontal anterior curved posterior auxiliary springs placed on the right and left sides, and a curved horizontal auxiliary attachment. This attachment contacted the bicuspid to prevent space closure. The auxiliary springs placed on the right and left sides of the appliance extended forward to engage the cuspids.

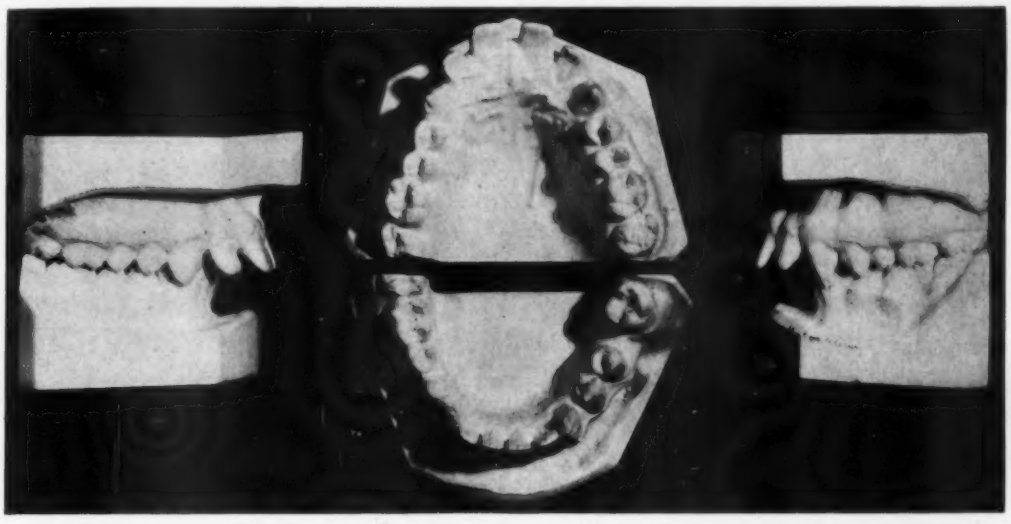


Fig. 1. Fig. 2. Fig. 3.

Fig. 1.—Right side before treatment. Note marked protrusion, overbite, and distal relation of teeth.

Fig. 2.—Occlusal view of upper and lower models. Note narrow maxillary arch, spacing and protrusion of anterior teeth, labial inclination of mandibular anterior teeth, and mutilation due to missing mandibular left first molar.

Fig. 3.—Left side, showing distal relation of mandibular teeth, protrusion of maxillary anterior teeth, and marked overbite.

Fig. 4. Fig. 5. Fig. 6.

Fig. 4.—Models occluded, showing right side after treatment. Note marked changes and corrections.

Fig. 5.—Models showing occlusal view of maxillary and mandibular teeth after treatment. Note maxillary arch symmetry, space closure of anterior teeth, and reduction of protrusion. The lower model shows space closure of mandibular anterior teeth with accompanying change of their axial position.

Fig. 6.—Left lateral view of teeth after treatment showing correct anteroposterior change of tooth position, proper axial relation, and reduced protrusion.

Labial Appliance.—The appliance was of medium high type (by technique classification, labial appliances are either high, medium high, or low) with perpendicular curved auxiliary springs extending over the incisal edges of the central and lateral incisors, labiolingually; also there were perpendicular loop springs contacting the anterior surface of the horizontally placed round buccal tubes.

The time of treatment was nineteen months.

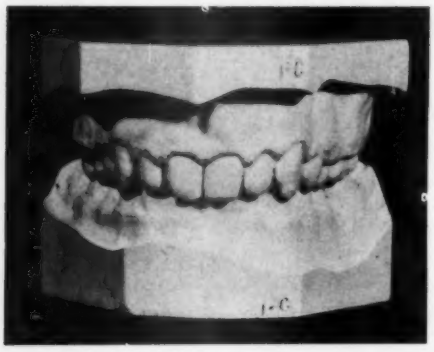


Fig. 7.—Front view of models showing favorable change after treatment. Note axial relation of teeth, overbite, and symmetric development of maxilla from cuspid to cuspid.

Fig. 8. Fig. 9.

Fig. 8.—Left facial profile, before treatment, showing chin prominence, marked concavity of lower lip, fullness of upper lip, also lack of facial symmetry due to malposition of teeth and hindered facial development.

Fig. 9.—Left facial profile, after treatment. Note with the exception of change of chin prominence, marked favorable change of facial symmetry, and facial development.

Adjustment of the Appliances.—Inasmuch as an occlusal guide plane was used, the lower appliances were made first, then the upper appliances. Such procedure is necessary in the majority of cases where the guide plane is used if the technique is to be followed in detail.

Upon completion of all appliances, the molar bands were then permanently fixed in the mouth, all appliances were placed, and the patient was dismissed for one week, having been instructed to wear intermaxillary elastics.

After one week, the patient returned and all appliances were checked and all reactions noted. As the appliances were found to be functioning properly, appointments and adjustments were made at four and five week intervals thereafter throughout treatment.

In such cases as the one we are discussing, we must remember that the forces of occlusion, which have long been disrelated now become reactive, and of course bring about changes which are directionally positive and normal. Therefore, in considering such changes along with function and biologic aspects, it is better that time lapse of appliance adjustments be greater; for as we all know, we are, by mechanical intervention, merely causing, or perhaps permitting, growth processes to function properly. Therefore, less frequent adjustments in such cases are an advantage.

Intermaxillary elastics were worn throughout treatment to facilitate proper anteroposterior relation of the mandibular anterior teeth with the occlusal guide plane, and in the beginning to reduce muscular fatigue, which, however, is not constant. A further purpose of the elastics is to create backward pull on the upper labial appliance. This in turn, due to opening the loop springs, allows the appliance to move posteriorly. This causes a change in axial relation as well as retraction of the maxillary anterior teeth due to the perpendicular auxiliary springs with which they are in contact.

Fig. 10. Fig. 11.

Fig. 10.—Front view, before treatment. Note lip relation and chin prominence, drawn facial appearance.

Fig. 11.—Front view, after treatment. Note general favorable change in facial symmetry as compared to Fig. 10.

The horizontal posterior-recurved posterior auxiliary springs were adjusted to give necessary lateral movement of the bicuspids and cuspids as the maxillary anterior teeth were retracted.

The horizontal anterior curved posterior auxiliary springs of the lower lingual appliance were correspondingly adjusted to cause slight lateral movement of the bicuspids and cuspids. This movement was necessary to facilitate correct change and cusp interdigitation of the mandibular posterior teeth with

Fig. 12.

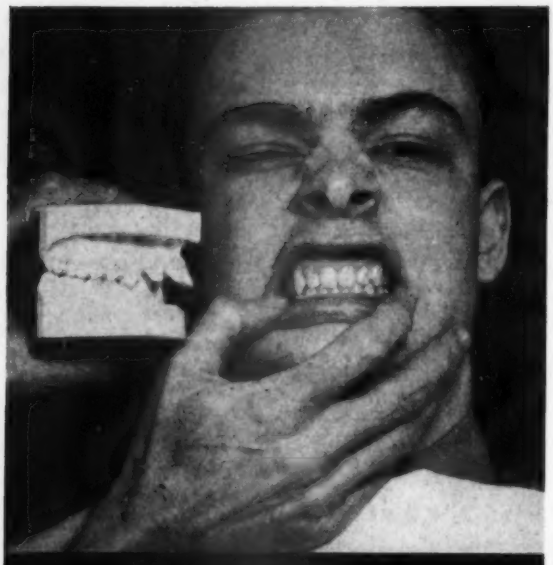


Fig. 13.

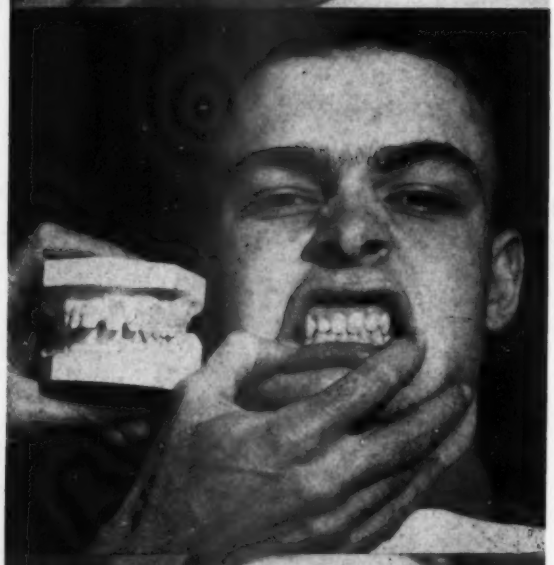
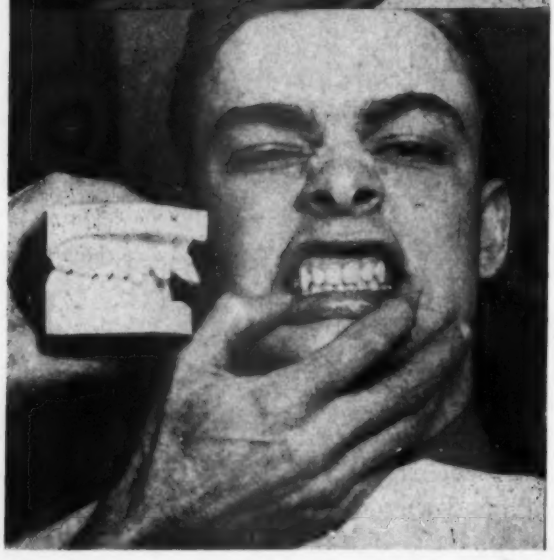


Fig. 14.

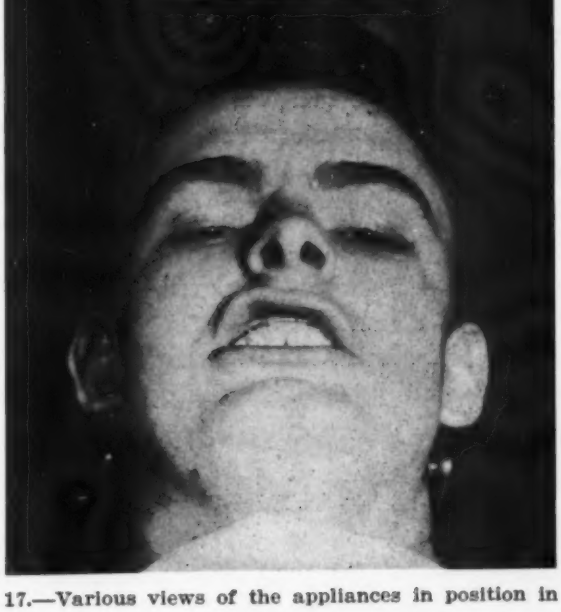


Figs. 12 to 14.—Favorable comparative views before and after treatment.

Fig. 15.

Fig. 16.

Fig. 17.



Figs. 15 to 17.—Various views of the appliances in position in the mouth.

the maxillary posterior teeth and to allow correct retraction, depression, and axial change of the mandibular anterior teeth.

With regard to the *horizontal curved auxiliary attachment,* we have already stated that it was placed for the purpose of preventing space closure.

The *perpendicular curved auxiliary springs* which were placed on the lower labial appliance, and which extended labiolingually over the incisal edges of the central and lateral incisors, were adjusted to retract and depress the teeth with which they were in contact. Depression was brought about by bending the labial appliance gingivally, inserting it in the buccal tubes, then springing it into proper position (the auxiliary springs bore a central relation, mesiodistally); thus a downward force, with resultant pressure, was exerted on the incisors.

Retraction of the teeth was accomplished by bending the auxiliary springs inward, slightly closing the loop springs and wiring the appliance in the buccal tube region. The backward pressure thus caused retraction of the teeth involved. When the loops are not closed, being wired in direct apposition with the anterior end of the buccal tubes, pressure is brought to bear on the teeth by periodic inward bending of the auxiliary spring proper.

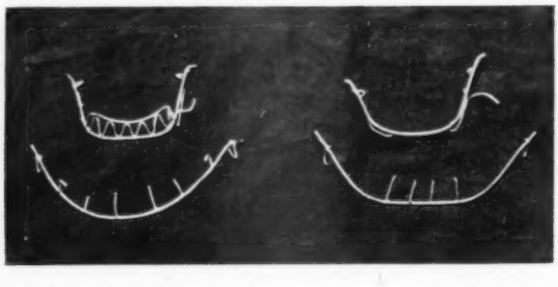


Fig. 18.—All appliances used in the treatment of the case and as explained in the text.

Molar stability was maintained by proper bending of the labial appliance so stress relation remained balanced, and by the intermaxillary elastics which to some degree further counterbalanced the molars under stress.

I have given thus far in abstract form what I consider of vital importance to the case under discussion. I shall make my remaining remarks in conjunction with the figures to be shown. This part of my discussion I shall try to limit to the visual changes and general pertinent points with regard to the considerations as mentioned in the synopsis.

Please appreciate that, in my opinion, insufficient time prevents parpharian considerations of a philosophic nature; and remember that the occlusal guide plane allows vertical growth of the posterior teeth, particularly the bicuspids. Finally, let me say that it is my belief along with others, particularly Dr. Oliver and Dr. Wood, that in cases of this kind the occlusal guide plane is definitely indicated and is a positive kindly adjunct by theory and fact.

612 Fulton Building

TREATMENT OF CLASS II, DIVISION 1 MALOCCLUSION BY MEANS OF THE EDGEWISE ARCH MECHANISM

SAMUEL J. LEWIS, D.D.S., DETROIT, MICH.

AS A part of this symposium on the treatment of Class II, Division 1 malocclusion, I have been asked by your Program Committee to present the method of the Angle edgewise arch mechanism as developed by Dr. Charles H. Tweed of Tuscon, Ariz.

Since 1936 it has been my privilege to work and collaborate with Dr. Tweed, and since adopting his philosophy of treatment and the modification of the edgewise arch technique devised by him, I have come to the conclusion that his principles and methods constitute a scientific theory of treatment.

It is Dr. Tweed's conviction, based on factual evidence, that in the successful treatment of all Class I, Class II, and bimaxillary protrusion types of malocclusion, the mandibular incisor teeth must be positioned on basal bone to be in functional mechanical balance, and, further, that this position is the normal one for these teeth and the most accurate guide available to the orthodontist in the scientific treatment of malocclusion.

Until recently Dr. Angle's definition of the "line of occlusion," as synonymous with harmony, balance, symmetry, beauty, art, and permanence of tooth position, was either ignored or not fully understood, though in general I believe orthodontists would agree that his definition was correct. However, owing in some part to the lack of precision in his definition, which left it open to superficial and varying interpretations, most of us who were the earlier students of Dr. Angle interpreted the normal as meaning only occlusal relationships and ideal arch form.

After considerable study of Dr. Angle's line of occlusion, together with experience in treating his own cases, Dr. Tweed concluded that there are six fundamental requirements which must be met if normal occlusion is to be the end result of orthodontic treatment. These six requirements are:

1. There must be a full complement of teeth, and each tooth must be made to occupy its normal position.
2. There must be normal cusp and occlusal relationships.
3. There must be normal axial inclinations of all the teeth.
4. There must be normal relationships of teeth to their respective jawbones.
5. There must be a normal relationship of the jawbones.
6. Normal function of all associated parts must be established.

In the course of his experiments, the purpose of which was to better his orthodontic procedure, Dr. Tweed studied the characteristics of the faces of

Presented before the American Association of Orthodontists meeting at New Orleans, March 16-20, 1942.

those of his patients for whom orthodontic treatment had been successful. As a result, he developed a well-defined concept of the normal, associated in his mind, as he says, with "an indelible image of a face, the features of which encompassed a composite of all six of the fundamental qualities found in the mouths and faces" of these children (Fig. 1). It is his belief that a concept of the normal is an indispensable part of the orthodontist's equipment, without which he proceeds blindly.

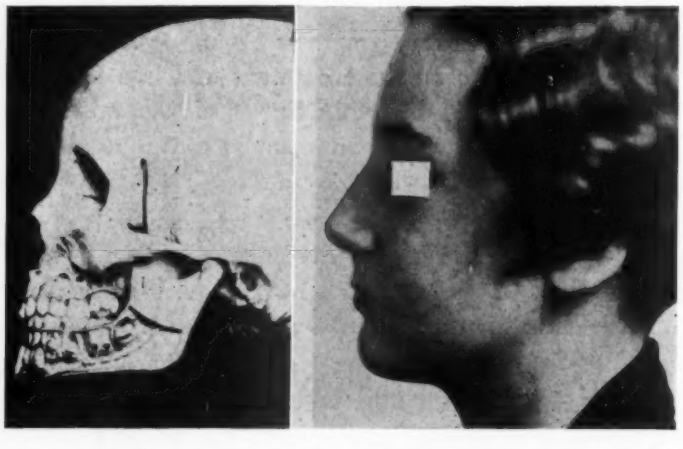


Fig. 1.—Dr. Tweed's conception of a well-balanced face, and normally positioned mandibular incisors.* (Courtesy of Dr. Charles H. Tweed.)

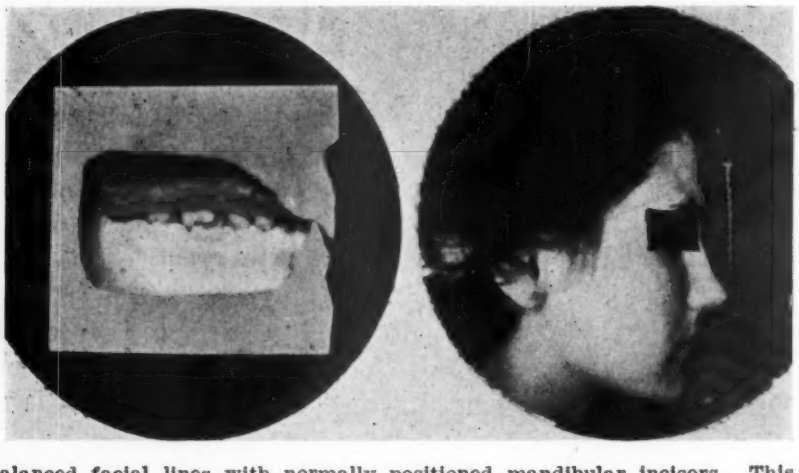


Fig. 2.—Balanced facial lines with normally positioned mandibular incisors. This is a non-orthodontic case.

For years he watched for faces that approximated his mental concept of the normal and whenever possible examined the mouths of those who presented such characteristics. He discovered that with few exceptions all had either normal occlusion or Class I malocclusions, and that the mandibular incisors were in all cases on basal bone, even though they were irregular in Class I cases. Thus it became evident to him that there is a definite correlation between balanced facial lines and the position of the mandibular incisors with relation to basal bone (Fig. 2).

*The skull is from the collection of Dr. Spencer Atkinson.

To familiarize himself with the normal relation of the mandibular teeth, especially the incisors, to basal bone, Dr. Tweed made a study of the mouths of persons with normal occlusion, in which the growth and development of both denture and face had apparently followed normal growth patterns, since orthodontic aid had not been required. Models of these cases, cross-sectioned through the body of the mandible and alveolar process at the median line, demonstrated that in each instance the mandibular incisors overlay the basal ridge of bone. Further study and observation of the relation of the mandibular incisors to their basal bones showed that when such a position was maintained—that is, when the mandibular incisors overlay the basal ridge of bone—there was virtually always a fine balance and harmony of facial esthetics (Fig. 3).

Fig. 3.—The writer's conception of a beautifully balanced face. This is an orthodontic face after the mandibular incisors were properly placed over basal bone.

These normal cases did present variations in the axial inclinations of the mandibular incisors. The normal demonstrating the greatest lingual axial inclinations of the mandibular incisors Dr. Tweed designated as –5; the normal demonstrating the greatest labial axial inclinations as +5; and the normal having nearly vertical axial inclinations as O (Fig. 4). He believes that a knowledge of this range of variability of the normal axial inclinations of the mandibular incisors is very important in treatment. Since, in his opinion, it is hardly possible for an orthodontist to predetermine where, in this scale of –5 to +5, the mandibular incisors must be positioned in order to be in functional and mechanical balance, his endeavor must be to place the mandibular incisors at –5 on the scale in order to safeguard against relapse (Fig. 5). As he remarks, most orthodontists would agree that there is little likelihood of positioning the denture too far distally in relation to the basal bones, and that if an error is made in this direction function will drive the denture forward so that eventually it will find its functional balance point somewhere within the range of –5 to +5.

As a result of his investigations Dr. Tweed concluded that the positions of the mandibular teeth, unless they were over their basal bones, could not be con-

sidered a guide in occluding the maxillary teeth; that the evidence all points to the acceptance of the relationship of the mandibular incisors to their basal bones as a guide in diagnosis and treatment; and that unless we first establish a normal relation of the mandibular teeth to the mandibular base and keep that relation throughout treatment, our sole procedure will have been tooth alignment rather than basic treatment, and the result will be merely a substituting

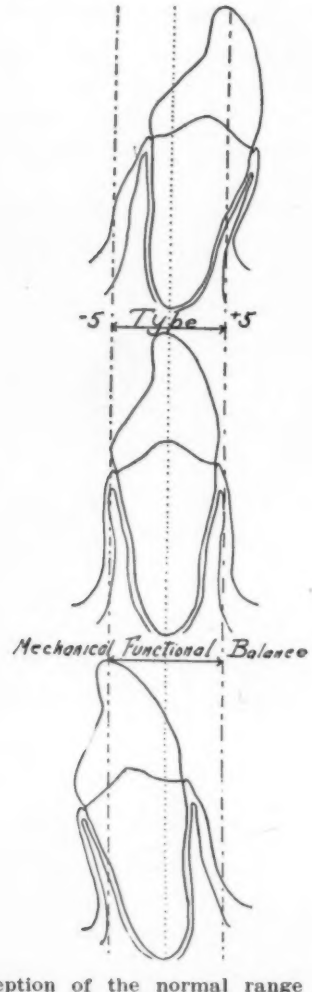


Fig. 4.—Dr. Tweed's conception of the normal range of variation in the position of the mandibular incisors on basal bone. The –5 position is the one recommended during orthodontic treatment.

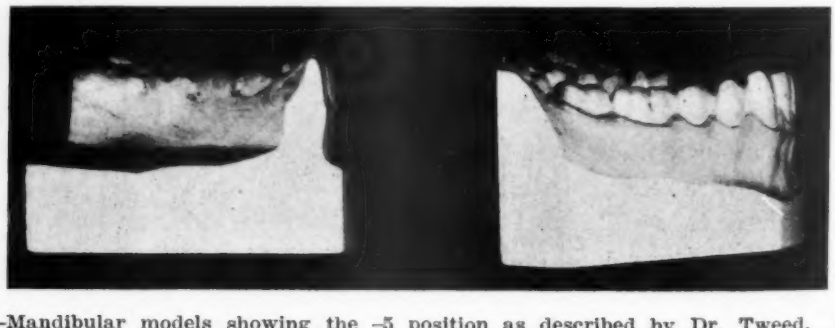


Fig. 5.—Mandibular models showing the –5 position as described by Dr. Tweed. Model to the left is the sagittal section of the one to the right.

of one malocclusion for another. In every instance, he says, where there is a failure to position the mandibular incisors correctly, something is lost in the balance and harmony of facial esthetics, and there is a failure to produce permanence of end results (Fig. 6).

Thus, to produce in his patients something approximating his picture of the normal, he found it necessary to revise and add a preliminary step to the Angle technique of treatment of malocclusion with the edgewise arch mechanism.

I should now like to describe the method of treatment which embodies Dr. Tweed's principles.

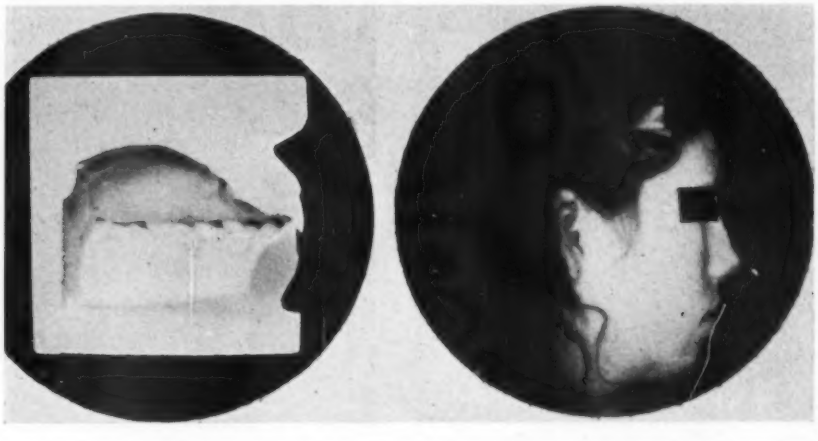


Fig. 6.—Profile of the face and sagittal section of models showing improperly placed mandibular incisors and the effect on the facial lines. This is a bimaxillary protrusion caused by orthodontic treatment.

PLAN OF TREATMENT

Treatment, according to Dr. Tweed's method, is divided into three steps:

1. Anchorage preparation in the mandibular denture, and, when necessary, the rearranging of axial inclinations in the maxillary arch, particularly in the incisal region of Class II, Division 1 cases, in such a way as to reduce their resistance to distal movements.

2. En masse movements to correct jaw relationships.

3. Detailed tooth positioning preparatory to retention.

In presenting the case report illustrating this method, I shall briefly describe the technical procedures of treatment, following these three steps. Details of treatment will be shown by means of typodont set-ups and twenty-five treated cases in the clinic to be given.

The case is that of a girl 11 years old, physically well, and of normal intelligence. Her medical history ran the gamut of the usual children's diseases, none serious in nature. Her adenoids and tonsils were removed prior to orthodontic treatment, though she remained a consistent mouth breather. She had the habit of sucking her lower lip, but as far as is known had no other undesirable habits (Fig. 7).

The classification is Class II, Division 1 (Angle). The mandible is in posterior relation to the maxilla, as indicated by the distal relation of the first

permanent molars; the arches are narrow with protrusive maxillary and mandibular incisors; the anterior overbite is deep, with mandibular incisors occluding with the soft tissues of the hard palate. The profile of the face is typical of this type of dentofacial deformity (Fig. 8).

Of the etiology little is known, except that the normal pattern of the face and occlusion was interfered with sometime between conception and birth. The lower lip habit undoubtedly aggravated to some degree the protrusiveness of the maxillary incisors, and the mouth breathing precluded in a measure at least the normal restraining influence of the orbicularis oris muscle.

Fig. 7.

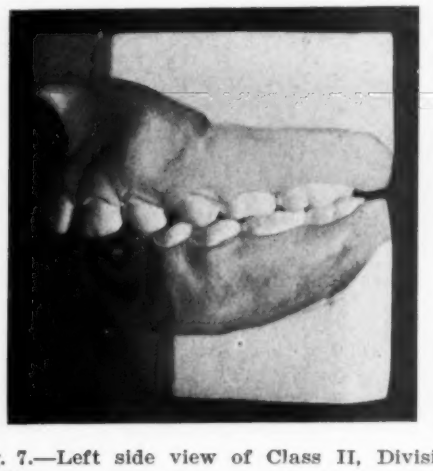


Fig. 8.

Fig. 7.—Left side view of Class II, Division 1 malocclusion presented as part of the symposium.

Fig. 8.—Profile face of patient whose models are shown in Fig. 7.

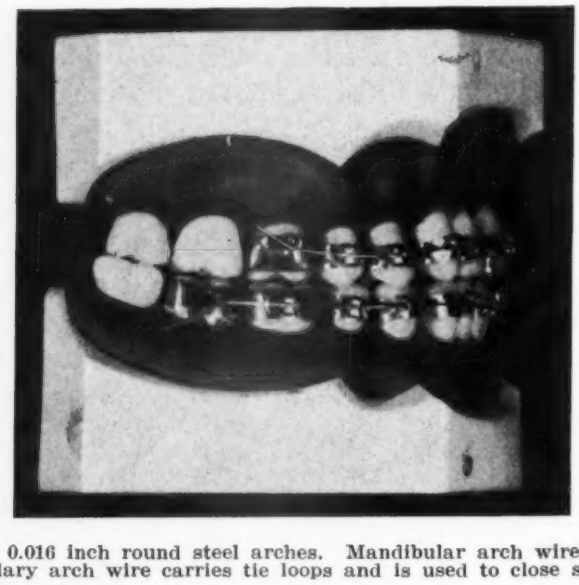


Fig. 9.—Preliminary 0.016 inch round steel arches. Mandibular arch wire is not tied in. The maxillary arch wire carries tie loops and is used to close spaces.

The period of active treatment was nineteen months, after which all appliances were removed and retaining plates were inserted.

All the teeth, deciduous and permanent, except the maxillary incisors, were banded with plain bands. All bands, except those on the first permanent molars,

carried the edgewise bracket and a mesial and distal staple. The molar bands carried an edgewise buccal tube, soldered on the buccal aspect.

After the bands were all cemented to place and tested for stability, 0.016 inch round steel arches were fashioned with bends to begin uprighting the molar teeth in both arches (Fig. 9). The patient was then dismissed for two weeks, or until the discomfort occasioned by initial tooth movements disappeared.

At the second visit an 0.020 inch round steel arch was fashioned and inserted, but this arch carried two small loop stops $\frac{1}{8}$ inch mesial to the buccal tubes (Fig. 9). This arch was tied to the buccal tubes by means of steel ligatures and was continued until loss of contacts was reduced. The patient was then again dismissed for two weeks.

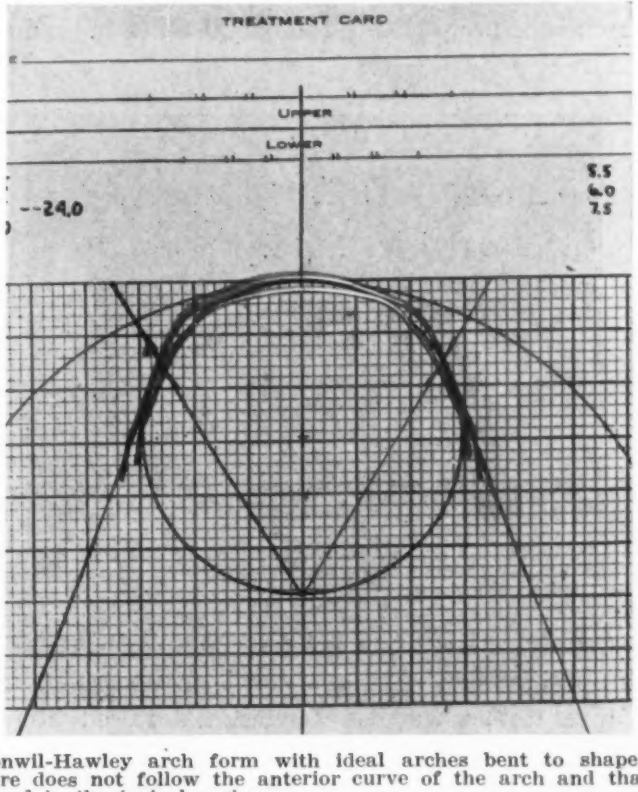


Fig. 10.—Bonwil-Hawley arch form with ideal arches bent to shape. Note that the maxillary arch wire does not follow the anterior curve of the arch and that the mandibular arch wire is flattened in the incisal region.

At the third visit a resilient 0.021 by 0.025 inch steel arch was fashioned for the mandibular arch, using the modified Bonwil-Hawley chart as a guide (Fig. 10). This step will be fully described and demonstrated in the clinic. It might be mentioned here that this first mandibular arch wire is flattened in the incisal region in order to gain better lingual crown torque in placing the teeth over basal bone. Later the incisal region is made more rounded. The arch is placed in the buccal tubes and brackets, care being taken that the scratch marking the center line is midway between the two central incisors. Scratch marks are made on the buccal aspect of the arch mesial and distal to the brackets on the cuspids and premolars, and one approximately $\frac{1}{16}$ inch mesial to the buccal tubes.

The arch is then removed, and with the 142 pliers second order or tip-up bends are placed in both buccal segments, including the cuspid teeth, if present. It is then again placed in the mouth and checked for accuracy. Scratch marks are now made just mesial to the buccal tubes, and anterior to the cuspid brackets. The arch is again removed and lingual crown torque of a mild degree, but coordinated with the degree of second order tip-up bends, is placed in the incisal and buccal segments. Its purpose is to tip or move the mandibular incisors lingually and back on basal bone, and to gain bodily movement of the buccal teeth during the expansion process.

Stops of 0.028 inch brass ligature wire are soldered immediately anterior to the buccal tubes, and intermaxillary hooks are soldered gingivally, anterior to the cuspid brackets. The arch is then placed in the mouth and ligated to place. As always, the arch is securely tied to the buccal tubes to bind the denture into one unit (Fig. 11).

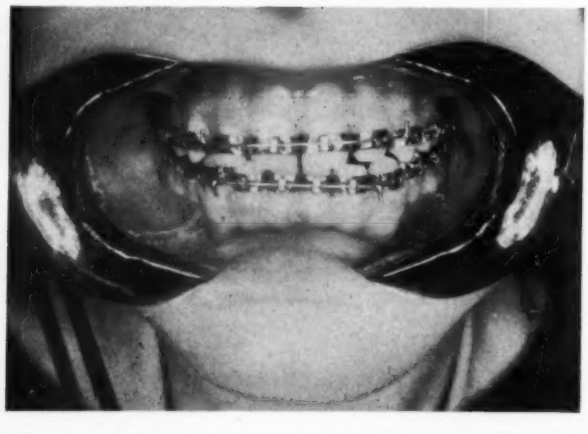


Fig. 11.—Complete edgewise arch wire setup showing types of stops and intermaxillary hooks. The stops and hooks are made of 0.028 inch brass ligature wire soldered to the steel arch with Handy and Harmon low fusing silver solder and Handy flux.

We are now ready to use Class III intermaxillary pull to move the mandibular teeth back and develop stationary anchorage or toe-hold to resist forward displacement of these teeth when Class II elastics are used later.

When the maxillary incisors are in as pronounced protrusion as they are in this case, bands are not cemented on these teeth at this time. In extreme protrusion cases it is a mistake to band all the teeth, insert square arches with bracket engagement, and have the patient wear intermaxillary elastics from the beginning of treatment (Fig. 12). Unless satisfactory preparatory work is accomplished and anchorage is intelligently diagnosed, the result is very likely to be double protrusion by the anterior displacement of the mandibular teeth, instead of distal movement of the maxillary teeth (Fig. 13).

A round 0.021 inch steel arch is now fashioned, into which are incorporated vertical loops between the cuspid and first bicuspid teeth. Second order or tip-back bends are placed in the molar, bicuspid, and cuspid teeth to resist displacement forward when the loops are activated. Four long spurs are soldered to the incisal segment of the arch wire and bent lingually over the incisal edges to prevent the arch wire from creeping gingivally and elongating these teeth. Dis-

tal pressure on the labioincisal angles of these teeth tips the crowns lingually without displacing the root apices labially. The loops are activated by tying the stops, which are placed about 1/8 inch mesial to the buccal tubes, to the buccal tubes with steel ligatures (Fig. 14).

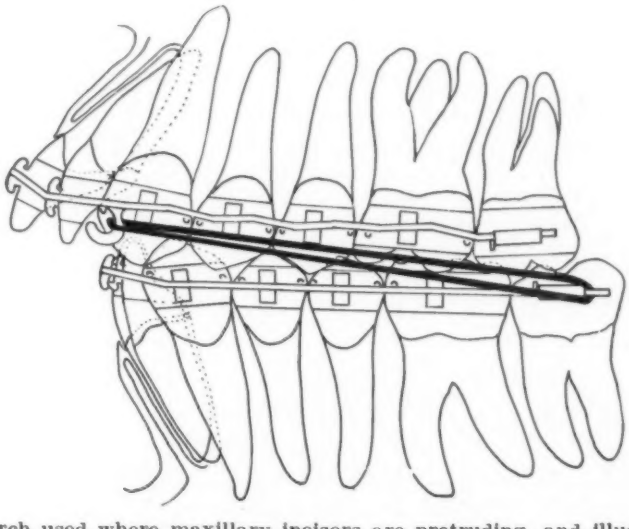


Fig. 12.—Square arch used where maxillary incisors are protruding, and illustrating how these incisors must be moved bodily, if moved at all. (Courtesy Dr. Charles H. Tweed.)

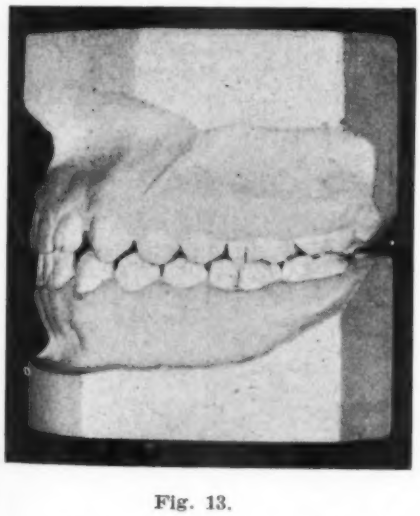


Fig. 13.

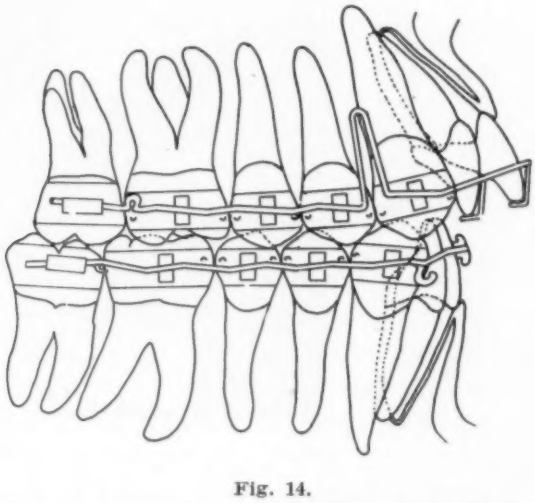


Fig. 14.

Fig. 13.—Bimaxillary protrusion caused by using square arch from the beginning of treatment.

Fig. 14.—Round 0.021 inch steel arch with vertical loops and incisal spurs to reduce the abnormal axial inclination of the maxillary incisors. (Courtesy Dr. Charles H. Tweed.)

When the excessive protrusive condition of the incisors is corrected—it is usually accomplished in from four to five weeks—these teeth are banded and a heavy stabilizing arch wire, 0.021 by 0.028 inch, is fashioned in ideal form on the chart. This arch replaces the round arch carrying the vertical loops and incisal spurs. Into this arch are incorporated slight molar kick-back bends, slight second order bends in the buccal segments, and slight lingual crown torque in the incisal and buccal segments. As always, these bends are coordinated with each other (Fig. 15).

A headgear is now constructed to be worn at night during the period of anchorage preparation in the mandibular arch (Fig. 16). In this technique the headgear is purely for the purpose of assisting in the preparation of mandibular anchorage, and not to move the maxillary teeth distally.

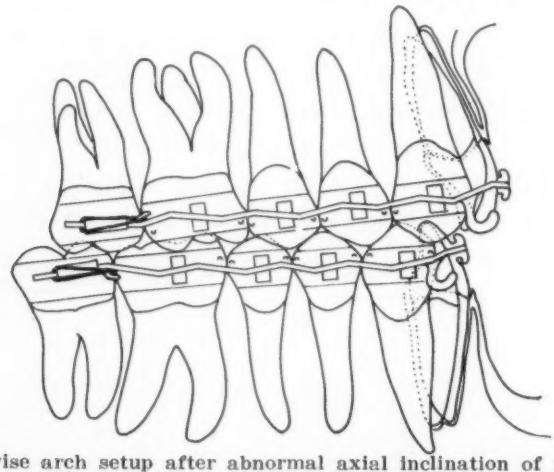


Fig. 15.—Edgewise arch setup after abnormal axial inclination of maxillary incisors has been corrected. The maxillary arch wire is 0.021 by 0.028 inch, while the mandibular arch wire is 0.021 by 0.025 inch. (Courtesy Dr. Charles H. Tweed.)

Fig. 16.—Headgear with face bow designed by Dr. Matthew Lasher. The headgear is used to assist in the preparation of anchorage in the mandibular arch and not to move maxillary teeth distally. Credit for this application of the headgear is due to Dr. Milton Fisher and Dr. Paul Lewis of Seattle, Wash.

With both arches in place, coordinated as to second order bends and lingual crown torque, light Class III elastics are worn during the daytime. At night, when the headgear is worn, heavier Class III elastics are used. As usual in both arches, the arch wire is tied securely to the buccal tubes to bind the whole dental arch into a unit. It is necessary to have the pull of the elastics on the headgear greater than the pull of the Class III elastics in order to prevent any mesial movement of the maxillary teeth occasioned by the Class III mechanics. The hooks on the headgear should be so placed that the pull of the elastics, when the loops are attached to the intermaxillary hooks on the maxillary arch wire, is parallel to the occlusal plane.

Adjustments during the period of anchorage preparation are made every two or three weeks. At the end of four months, if these adjustments are carried out in accordance with a definite plan or technique, stationary anchorage or toe-hold will be present in the mandibular arch, the incisors will be placed upright and over basal bone, and stationary anchorage or toe-hold in the maxillary arch will be broken down to lessen the resistance to distal en masse movement of the maxillary teeth (Fig. 17).

Having completed anchorage preparation, we are ready for the next step in treatment, that of distal en masse movement of the maxillary teeth, and correction of jaw relations.

The resilient mandibular arch wire is removed at this time and replaced with a heavy, 0.021 by 0.028 inch stabilizing arch wire. Identical second-order bends and lingual crown torque are placed in this arch wire, and the arch wire is then securely tied into the brackets and to the buccal tubes.

A resilient ideal arch wire of 0.021 by 0.025 inch steel is carefully fashioned for the maxillary arch. Slight second order bends are incorporated along with slight lingual crown torque in the incisal segment. As previously, all bends are coordinated or synchronized, so that all units will be moving in the same direction (Fig. 18).

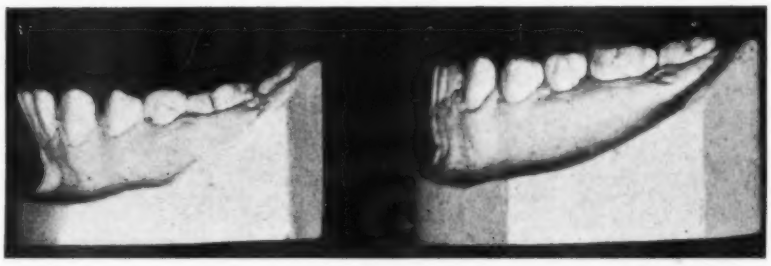


Fig. 17.—Stationary anchorage in the mandibular arch. Model to the left shows case before anchorage is prepared. Model to the right shows incisors uprighted over basal bone and molars tipped up and back to gain toe-hold.

The patient is now instructed to wear mild Class II intermaxillary elastics. The headgear is no longer used. After two weeks the upper arch is removed again and the degree of second order bends and incisal torque is accentuated. Stronger intermaxillary elastics are used at this time.

At the next appointment the lower anchorage units are checked. If the mandibular molar teeth show the slightest signs of mobiltiy, the arch wire is removed, the molar kick back bends are increased slightly, and all second order bends in the buccal segments are increased in identical amount. Mass lingual crown torque in the incisal segment is increased until it corresponds in degree to the second order bends. Slight additional lingual crown torque is placed in the distal segments of the arch wire to torque the crowns of the molar teeth lingually and their roots bucally. It must be remembered that coordinating every unit in the mandibular arch to resist forward displacement develops the greatest amount of intraoral anchorage.

At intervals of two to three weeks the degree of bends in the maxillary arch wire is increased, always in coordination, until normal mesiodistal relation-

ships of the teeth are attained. This treatment is continued until the incisors present an edge-to-edge relationship. The intermaxillary elastics are then discontinued for two weeks to make certain that there has been sufficient en masse movements of the maxillary teeth. If there has not, the treatment is continued as formerly. If the movement is considered complete, intermaxillary elastics are again applied until an edge-to-edge incisal relationship results.

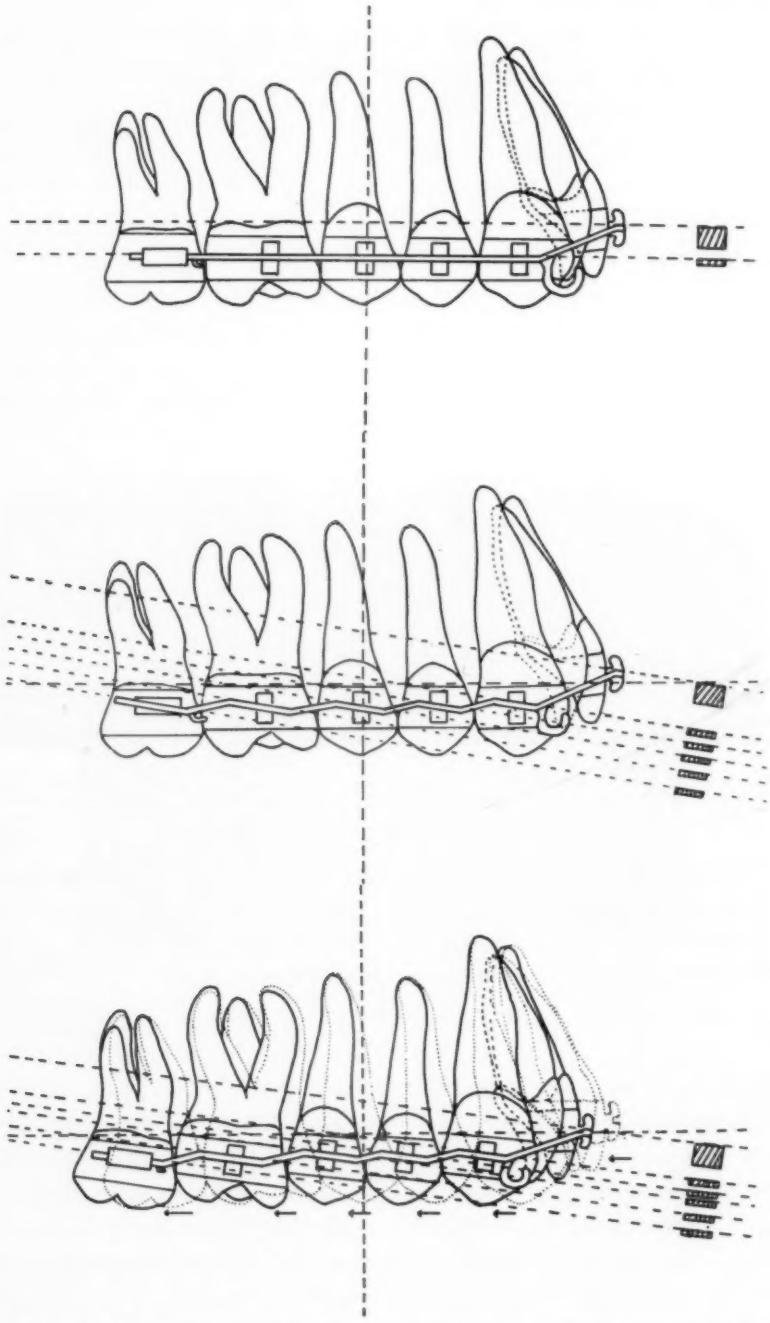
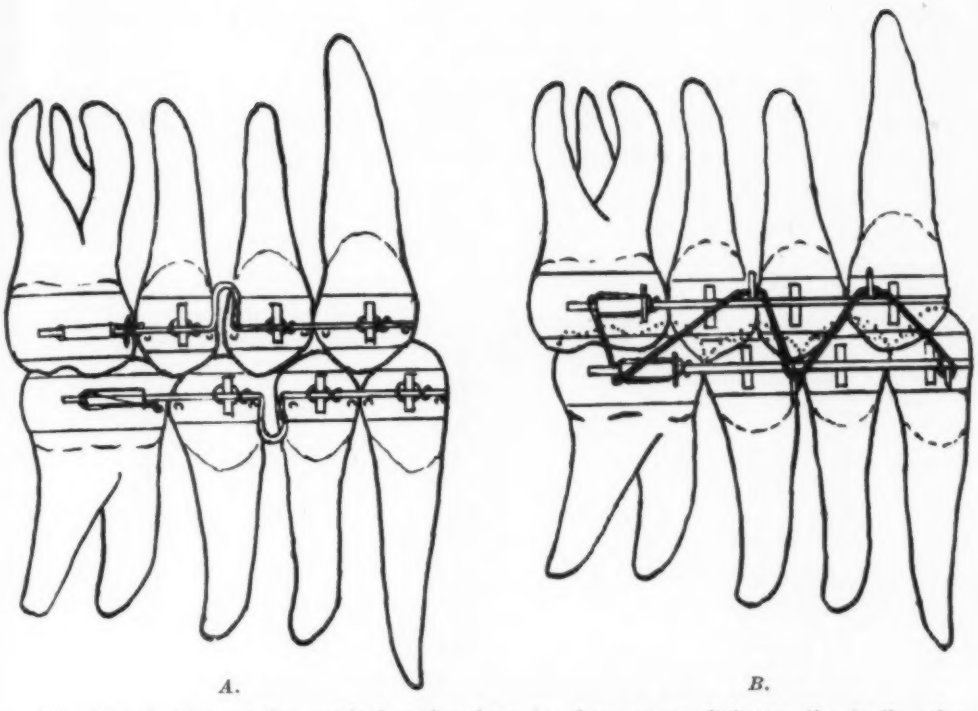


Fig. 18.—*A*, Arch wire in passive state. *B*, Correct coordinated second order bends with torque. *C* illustrates action when intermaxillary force is applied to coordinated second order bends and lingual crown torque. (Courtesy Dr. Charles H. Tweed.)



A. *B.*

Fig. 19.—*A*, Use of the vertical spring loop to close spaces between the teeth prior to retention. *B*, Use of up and down elastics to assist in seating the cusps of teeth into their proper positions prior to retention. (Courtesy Dr. Charles H. Tweed.)

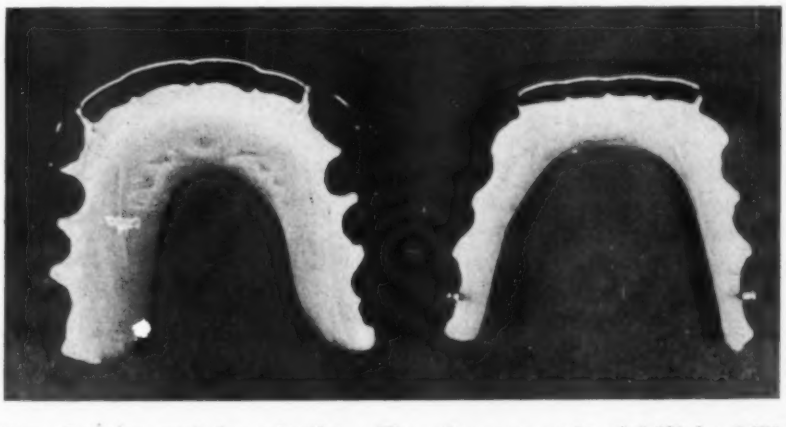


Fig. 20.—Types of plates used for retention. The wires are made of 0.021 by 0.028 inch steel.

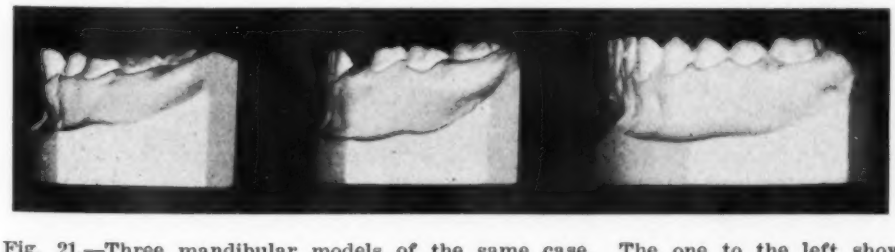


Fig. 21.—Three mandibular models of the same case. The one to the left shows the original condition. The center one shows the permanent molar tipped up and back to gain toehold. The one to the right shows the case after retention was removed, with the tipped molar back into normal position. No force except function was operative in straightening the molar.

When this stage is reached it may be necessary to accomplish detailed positioning of the teeth, especially the bicuspids which may not have their cusps properly seated. It is also a good practice to toe the maxillary lateral incisors slightly in by the use of a second order bend at the lateral incisor bracket. The seating of the cusps, if necessary, is accomplished by the use of up and down elastics, prior to retention. The arches used during the detailed positioning stage must be bent carefully to the ideal form in order to place the teeth artistically in the arches (Fig. 19).

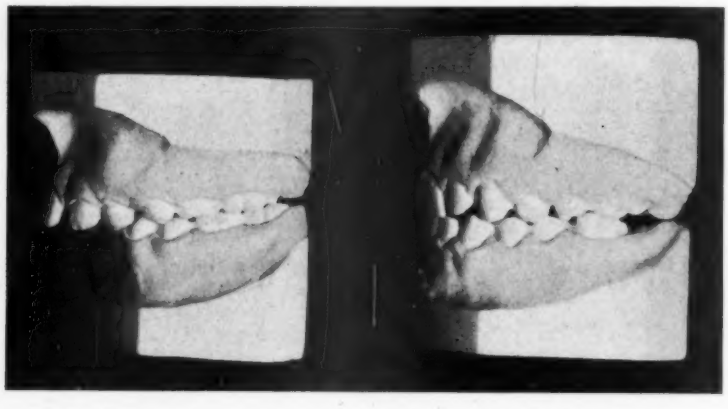


Fig. 22.—Side view of models before and after treatment.

Fig. 23.

Fig. 24.

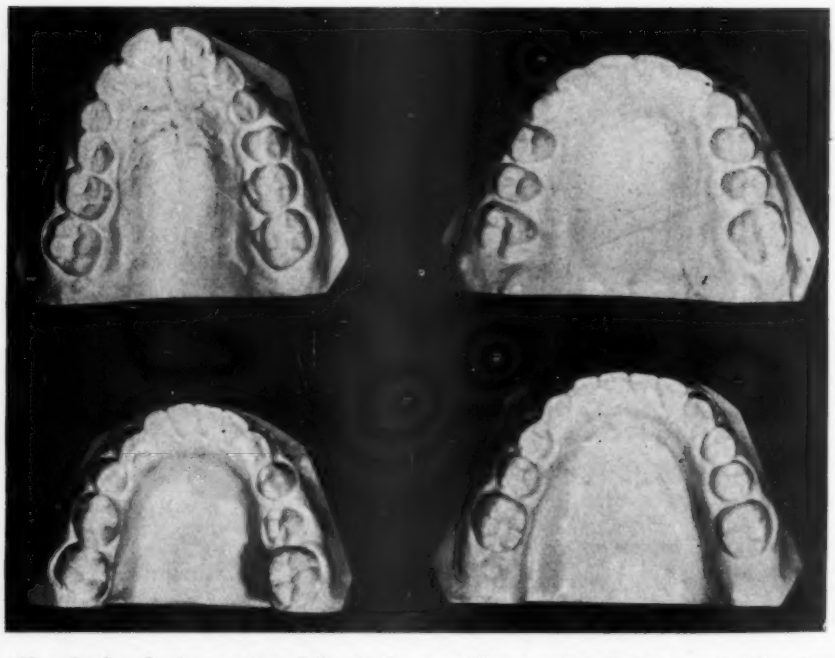


Fig. 23.—Occlusal views of models of the maxillary arches before and after treatment.
Fig. 24.—Occlusal views of mandibular arches before and after treatment.

The case is now ready for retention. All bands are removed, and the teeth carefully cleaned. A lower Hawley type plate is fashioned with a flat wire bent around the labial aspect of the incisors and cuspids, with stops in the lingual grooves of the first permanent molars. The upper retainer is fashioned

with a flat wire bent around the four incisor teeth. If the cuspid teeth need to be held, two spurs, soldered to the steel wire, are fitted to the buccal aspect of these teeth. A bite plane is placed in the upper retainer to hold the edge-to-edge occlusion. Retainers are worn day and night for a few weeks, after which they need be worn only at night. The retention period varies in different cases, but as a rule the retainers can be discarded within six to twelve months (Fig. 20).

It might be well at this point to answer a question often put to the followers of this philosophy and technique; that is, what happens to the molar teeth when they are tipped up and back during anchorage preparation, particularly in the mandibular arch? During the retention period these molars straighten themselves and again become solid units (Fig. 21).

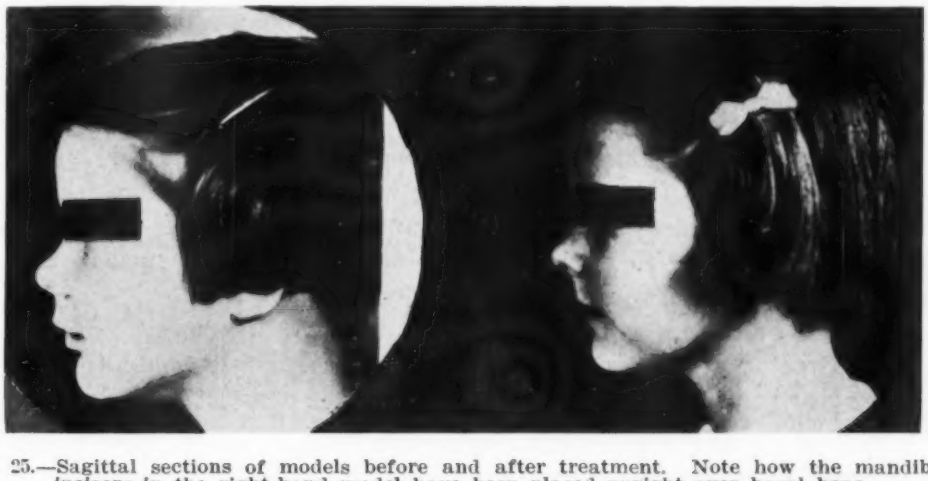


Fig. 25.—Sagittal sections of models before and after treatment. Note how the mandibular incisors in the right-hand model have been placed upright over basal bone.

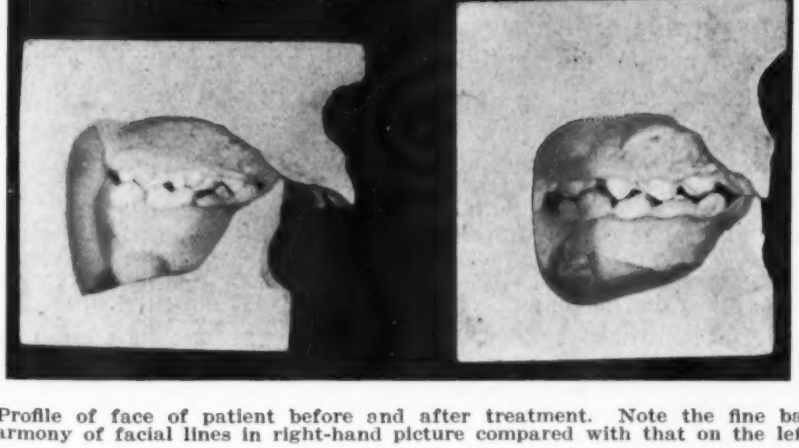


Fig. 26.—Profile of face of patient before and after treatment. Note the fine balance and harmony of facial lines in right-hand picture compared with that on the left.

The following figures show what has been accomplished in the case I have presented. All steps in the technique I have described were carefully followed. The end result in this Class II, Division 1 case embodies, in my opinion, all six requirements of the line of occlusion as described by Dr. Angle and interpreted by Dr. Tweed (Figs. 22, 23, 24, 25, and 26).

308 David Whitney Bldg.

SOME ANATOMIC FACTORS GUIDING TREATMENT THERAPY

SPENCER R. ATKINSON, D.D.S., PASADENA, CALIF.

RESEARCH workers maintain an open unprejudiced mind, questioning and testing all available evidence, seeking only simple, naked truth. Their recorded work may be repeated again and again; the same findings will be disclosed.

The horizon of the biologic sciences is ever being broadened. Truths are being discovered and made available for use in practical clinical procedures. The bond between the research worker, the orthodontist, and the clinician should be intimate and cordial. Coordination of their best efforts is necessary if humanity is to be benefited. There is much yet to be learned, it is true, but the science of orthodontics has gone a long way and at a rapid pace. Old discoveries should be modernized and the new made practical. To make necessary adjustments from time to time, ever keeping abreast of the modern trend, is not only costly in effort and money, but often in ego as well.

An orthodontic appliance never moves a tooth. By using force, a tooth may be extracted even from the jaw of a cadaver, but it would be absurd to expect any orthodontic appliance exerting even the greatest possible amount of force, to move malposed teeth of a cadaver into the line of occlusion.

It is not force, therefore, but cellular activity that brings about the desired structural changes. It is our concern to select orthodontic appliances capable of delivering to the teeth and jaws the most nearly correct amount of controlled force capable of inciting proper cellular activity in a selected area of the anatomy of a particular individual. It is now known that even the slightest amount of artificial force applied to a tooth will incite cellular activity, causing the tooth to move. Optimum beneficial reactions of the osteoblasts and osteoclasts follow the stimulation of normal, natural growth force. Their number and activity decrease as force is increased.

When bone is resorbed under the influence of artificial stimulation, there is also resorption taking place on the cementum of the tooth root. The extent of this resorption of the cementum of the tooth root depends upon the amount, character, and length of time force is applied, the age and condition of the patient, the location and environment of the tooth. A strong positive force suddenly applied causes an unbelievable amount of cementum resorption in a very short period of time.

In a case of double protrusion in which it seemed advisable to extract two maxillary first bicuspids, Oppenheim of the College of Dentistry, University of Southern California requested that a grass line ligature be placed

Read before the American Association of Orthodontists and the Inter-American Orthodontic Congress, New Orleans, La., March, 1942.

First North American serial right only.

Professor of Orthodontics; Director, Graduate Orthodontics, College of Dentistry, University of Southern California, Los Angeles.

between the two bicuspids on one side and wire ligature on the opposite side. In twenty-four hours the first bicuspids were extracted, slides made and examined under the microscope. Here was clearly demonstrated the result of stimulation applied by both grass line and wire. The progress of cementum resorption in the twenty-four hours was startling. That caused by the wire was deeper and more extensive than by the less abrupt force of grass line.

Again, a skull was selected in which indications pointed to a tooth being forced out of line by an erupting tooth. This tooth which was being pushed out of line was extracted; examination disclosed resorption evidently resulting from the pushing force of the erupting tooth.

As damage is undoubtedly caused by all orthodontic appliances, much less damage would be caused by utilizing as much as possible our knowledge of the directions and amount of growth of different areas of the mandible and maxilla, taking advantage of the distribution of cancellous bone, moving the teeth in the most favorable environment, and by using the most gentle force possible. Cementum resorptions caused by appliances may promptly recover.

The orthodontist is concerned with growth and development. It is not sufficient for him to know gross anatomy of the adult and the embryo; the age range he is particularly concerned with comes from shortly after birth until adulthood.

From birth to adulthood the structural elements of the masticatory apparatus are in a constant though orderly change in relationship. Various parts grow at different rates of speed and amount. Areas which might seem to serve as reliable landmarks at one age may be entirely misleading at another age. Hence, as a successful orthodontist depends upon the ultimate result of growth, it is essential that he has an intimate knowledge of those structures which may enable him to have a clear conception of just what one might expect the normal to be at any age of development. This is of prime importance, for unlike the dentist, he is not permitted, if he makes a mistake in treatment, to retreat with all the advantages he might have originally had. He is forced to treat from that point on for one cannot make either time or development go backward.

At birth the bones of the maxilla and mandible are exceedingly porous; their connections or articulations are loose and yielding; growth is very rapid—all conducive to permanent deflection from the inherited pattern if undue or unnatural pressures are brought to bear in these areas (Fig. 1).

Deflections from the patterns of normal growth occur even more readily as the permanent teeth begin to form in their crypts in the body of the bone and the deciduous teeth start their eruptive processes (Fig. 2).

If there is no undue pressure brought to bear on the masticatory apparatus, this mechanism should develop in an orderly, efficient manner, meeting the requirements of the individual as growth proceeds, being guided into its ultimate form or type by hereditary influences as well as function (Fig. 3).

The permanent teeth in both jaws anterior to the first permanent molar develop to the lingual of the respective deciduous predecessors. At 6 months of age, one actually has two sets of developing teeth (Fig. 4).

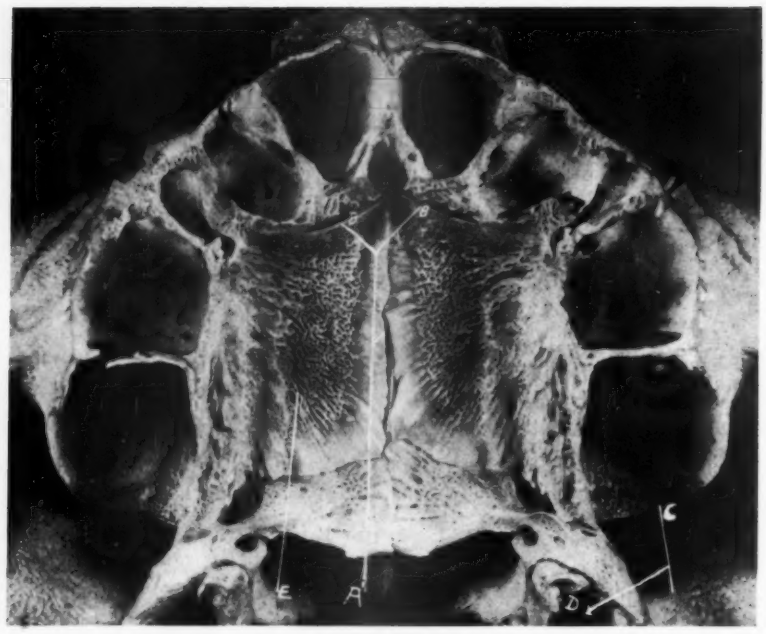


Fig. 1.—Palatal view of maxilla at birth: *A* and *B*, sutures in premaxilla and midline are open and loosely connected. The articulations between the palate bones and maxilla being overlapping and loosely connected; *C*, the tuberosity of the maxilla is completely lateral to the pterygoid plates, *D*, of the sphenoid bone and hamular process: *E*, directions of growth are indicated by directions of spicules and nutrient canals emanating from centers of ossification.

Fig. 2.—Skull approximately 1 year of age; *a*, a suture over the infraorbital canal is in reality a slightly movable joint usually disappearing at about the age of 10 or 12 years. The infraorbital canal is mesial to the center of the orbit; when full growth is attained, it is found in the center, below the lower border of the orbit; *b*, the articulations between the maxillary and malar bone are very loosely connected as are the other articulations of the bones of the face; *c*, the erupting first deciduous maxillary molar; *d*, a bulging of the canine fossa caused by the crypt of the developing canine; *e*, remains of the suture which divided the mandible into two parts until shortly before birth.

Fig. 3.—Cross section of the mandible of a horse in the region of a molar tooth, showing arrangement of supporting bone structure harmonizing with stresses produced by function.

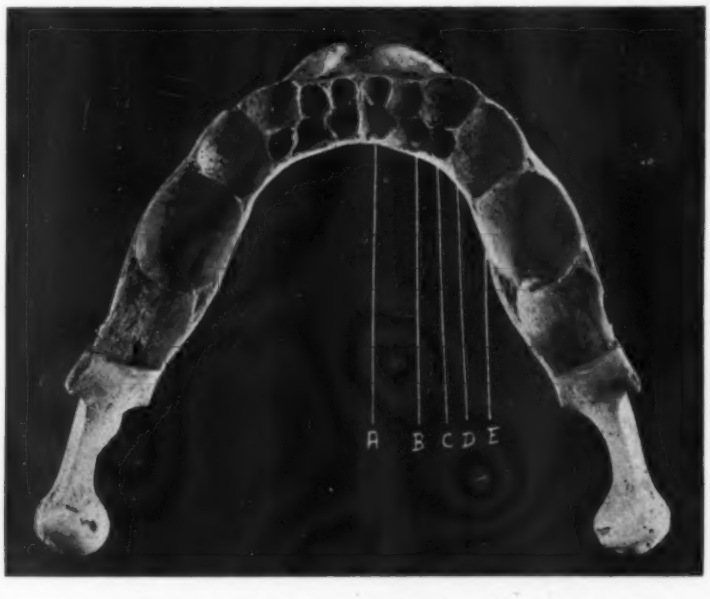


Fig. 4.—Mandible of child 6 months of age, showing the normal double row of teeth at this age and the extent to which the body of the mandible is occupied by developing teeth. *A*, Crypt of permanent central incisor; *B*, crypt of permanent lateral incisor; *C*, crypt of permanent canine; *D*, crypt of first premolar; *E*, crypt of second premolar.

Cross sections of a mandible of a child approximately 26 months of age were made through the bifurcations of first and second deciduous molars, revealing the crypts of the developing bicuspids. The development of the first bicuspid precedes that of the second bicuspid (Fig. 5).

In Fig. 6, a cross section in a similar region as in Fig. 5 shows the growth of the crypt further advanced. Several sections were made in the mandible of a child approximately 26 months of age, showing relative development of other permanent teeth, and the opening of each gubernaculum (Fig. 7).

In Fig. 8, cross sections were made in the area of the central incisors of mandibles at various ages of growth, illustrating the desirability of accomplishing movements of the anterior teeth before the age of 14.

Similar growth processes occur in the maxilla. Sections were made of the maxilla of a child approximately 4 years of age, demonstrating again the path of growth of the developing permanent teeth (Figs. 9 and 10).

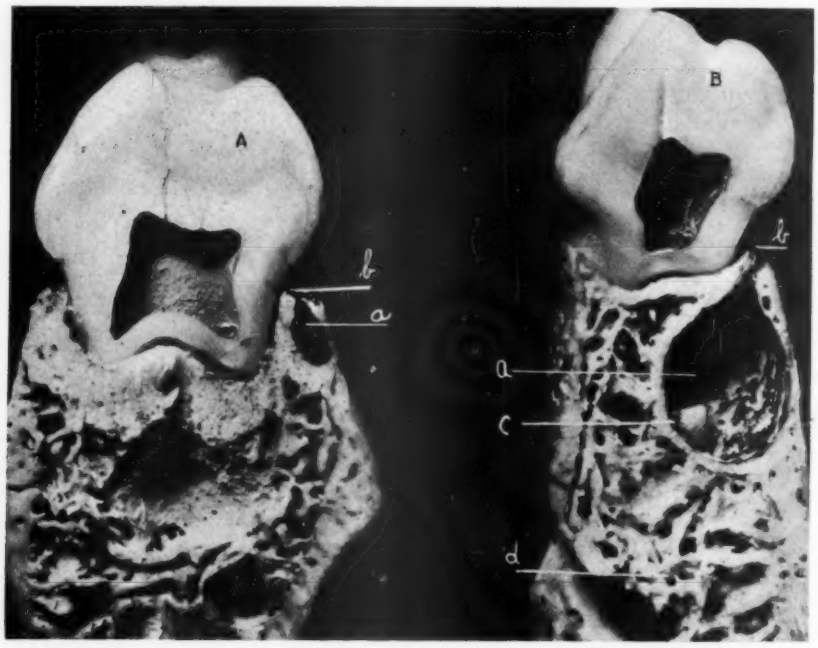


Fig. 5.—Cross sections of mandible, specimen approximately 26 months of age at bifurcation of second deciduous molar, showing crypt of the follicle of the second bicuspid developing at *A-a;* the second bicuspid develops until it reaches the level of the mandibular canal; *A-b,* the point of which the soft tissue of the follicle meets that of the oral cavity. *B,* A similar section of the first mandibular deciduous molar; *B-a,* and *b,* corresponding to similar points on *A*. *B-c,* Buccal cusp beginning calcification of first premolar. The floor of the crypt will extend as growth proceeds and will extend into the body of the mandible until it reaches the superior border of the mental foramen *d;* the follicle does not approach the lower border of the mandible as does that of the second premolar.

In the maxilla there is a decided change in the relationship of the different tooth follicles as development proceeds. At 5½ years of age, the crypt of the permanent canine is in contact with the crypt of every permanent tooth from the midline to the first permanent molar. As growth proceeds this relationship changes (Figs. 11 and 12).

Vertical transverse sections were made of a specimen at birth in the region of the first deciduous molar tooth, the crypt of which lies principally above the floor of the nose. The body of the mandible, and the maxilla, is almost completely occupied by these growing teeth (Fig. 13).

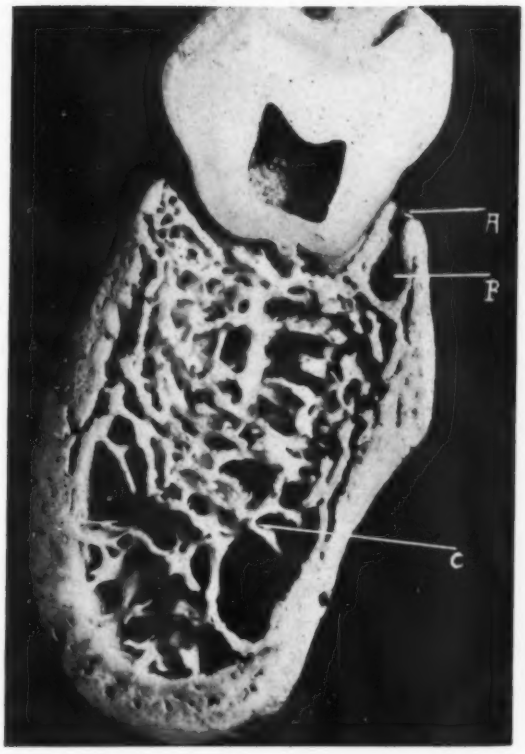


Fig. 6.—Section of the mandible of a specimen approximately 27 months of age showing the downward growth of the second bicuspid; *A*, leaving the characteristic opening which accommodates the gubernaculum of the tooth follicle, *B*. In this specimen there are the normal characteristics and distribution of cancellous bone, *C*, in which this tooth follicle may develop.

Fig. 7.—Specimen 26 months of age; cross sections through the different teeth: *A*, lateral incisor; *B*, canine; *C*, first deciduous molar; *D*, second deciduous molar; *E*, first permanent molar; *F*, *G*, second permanent molar.

A similar section was made of a skull 3 years of age showing the extent of vertical development of the jaws, relative position of the crypts of the canine, the first bicuspids, and development of the maxillary sinus and nasal cavity (Fig. 14). This development continues until adulthood is reached (Fig. 15).

Fig. 8.—Different stages of development of the permanent incisors and their pertaining alveolar process: *A*, two months; *B*, seven years; *C*, nine years; *D*, eleven years; *E*, sixteen years; *F*, twenty-five years.

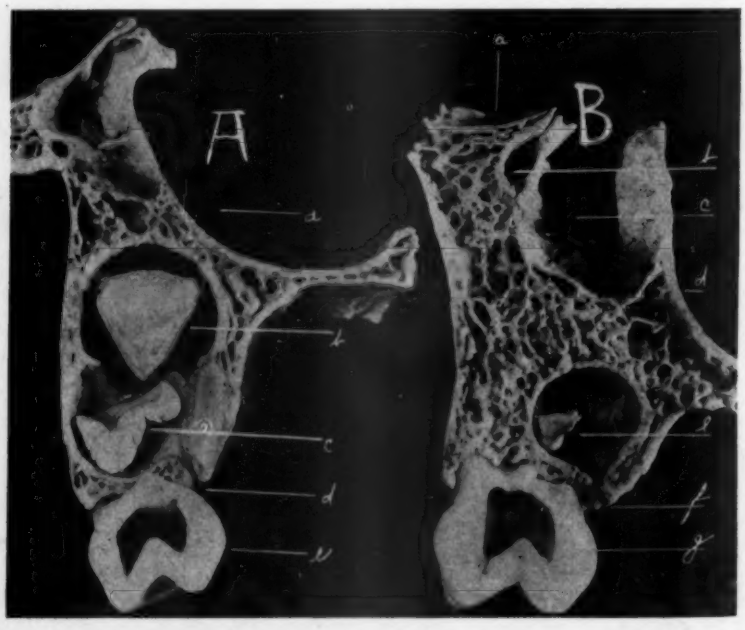


Fig. 9.—*A*, Section of maxilla at bifurcation of roots of first deciduous molar. Specimen approximately 4½ years of age; *a*, floor of nasal cavity; *b*, crypt containing partly formed crown of permanent canine; *c*, crypt containing partly formed crown of first premolar; *d*, opening for gubernaculum to follicle of first premolar; *e*, crown of maxillary deciduous first molar. *B*, *a*, floor of orbit; *b*, infraorbital canal; *c*, maxillary sinus; *d*, lateral wall of nasal cavity; *e*, crypt containing buccal cusp of developing second premolar; *f*, opening for gubernaculum to follicle of second premolar; *g*, crown second deciduous molar.

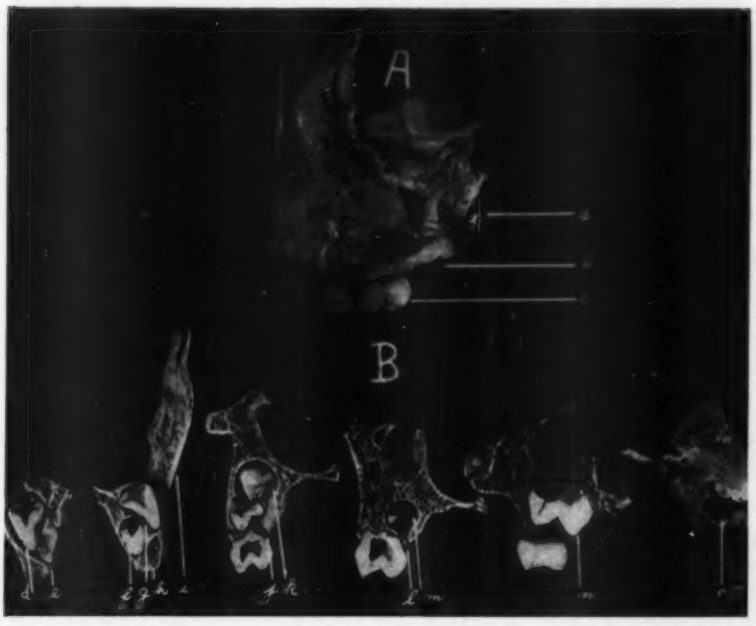


Fig. 10.—*A*, left maxilla. Age about 5 years; *a*, crypt of developing second permanent molar on posterior surface of tuberosity occlusal surface is directed backward and downward; *b*, crypt containing calcified crown of first permanent molar which is inclined downward and slightly backward; *c*, second deciduous molar. *B*, Right maxilla of same skull as *A*, with sections made through center of crown of permanent central incisor *d* and *g*; section through center of first deciduous molar showing first deciduous molar *j*, first premolar, and canine, *k*, in same vertical line; *l* and *m*, second deciduous molar crypt and developing buccal cusp of second premolar. Note opening for gubernaculum at *l*; *n*, first permanent molar crown and crypt for second permanent molar, *o*.

Fig. 11.—Left maxilla with buccal plate removed exposing crypts of permanent teeth and gubernaculum channels; *a*, crypt of permanent central with its gubernaculum opening *b*; *c*, gubernaculum opening into crypt of *d*, permanent lateral incisor; *e*, gubernaculum opening into crypt of *f*, permanent canine; *g*, gubernaculum opening into crypt of *h*, first premolar; *i*, gubernaculum opening into crypt, *j*, of second premolar; *k*, crypt of first permanent molar; *l*, crypt of second permanent molar. Note the canine crypt is situated in a line with the opening of its gubernaculum and this crypt at 5½ years of age is in contact with the crypts of every permanent tooth between the first permanent molar and the midline.

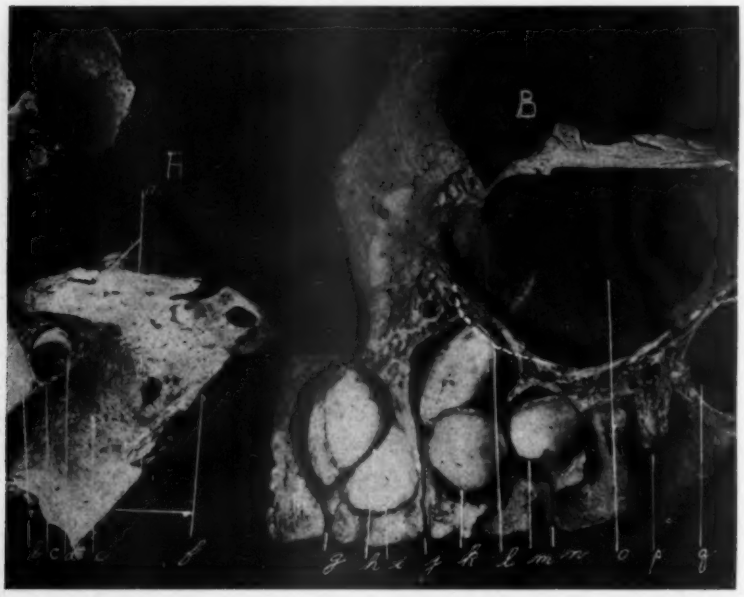


Fig. 12.—*A*, Right maxilla from above down. A section was made just above and parallel to the floor of the nose removing the top of the crypt of the canine tooth exposing its calcified crown and showing the boundaries of the triangle in which the crown develops; *a*, canine fossa, the floor of which forms one wall of the canine crypt; *b*, anterior wall of the antrum forming the second wall of the canine crypt; *c*, lateral wall of nasal cavity forming the third wall of crypt; *d*, crown of canine; *e*, floor of nose; *f*, median suture for articulation with opposite maxillae. *B*, Buccal plate removed showing crowns of permanent buccal teeth in place. The canine is deflected backward encroaching upon the antrum. These three plates come to a peak to form the nasal process of the maxilla. Should vertical development be retarded there would not be sufficient room contained in these three walls for the growing canine. The wall of the antrum being the weakest is the one which yields to the growing canine.

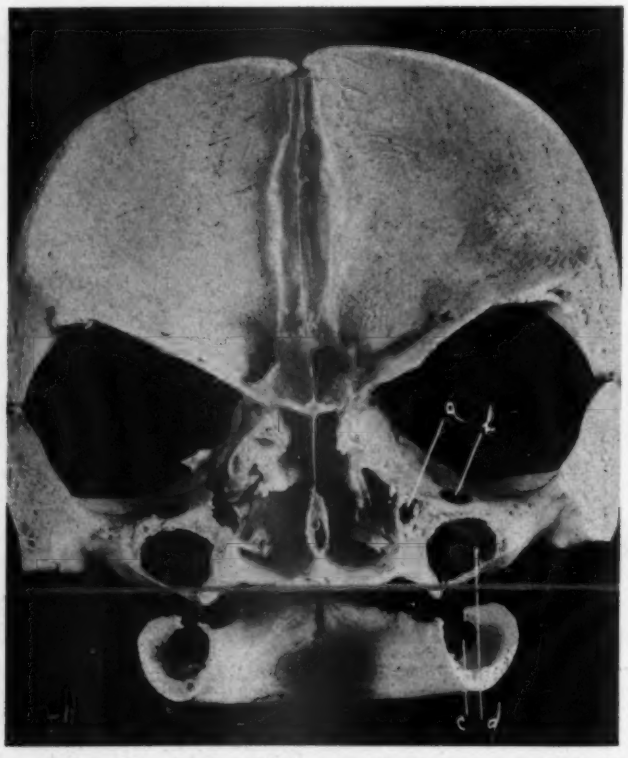


Fig. 13.—Cross section of a skull at birth at mid-point of second deciduous molars. View from behind forward; *a*, maxillary sinus, which averages about 4 mm. before backward, 2 mm. wide and 3 mm. in height; *b*, infraorbital canal; *d*, crypt of developing second deciduous molar, the cusps of which are calcified and occasionally united. These crypts lie above the floor of the nose and directly under the infraorbital canal; *c*, crypt of mandibular second molar; at the base of this crypt may be seen the lumen of the mandibular canal.

Note axial relation and position of roots of teeth exposed in Fig. 16. In the maxilla, the first, second, and third permanent molars develop successively in the distal portion of the tuberosity of the maxillary bone. The tuberosity of the maxillary bone in a child is situated outward from the pterygoid plates. As a child grows older, this relationship changes until the denture is completely formed, at which time the tuberosity of the maxilla lies directly anterior to the pterygoid plates of the sphenoid bone (Figs. 16, 17, and 18).

Fig. 14.—Cross section of skull approximately 5 years of age; *a*, lacrimal duct; *b*, canine crypt encroaching on maxillary sinus; *c*, crypt of canine; *d*, maxillary sinus; *e*, distal wall of first premolar; *f*, second deciduous molar.

Fig. 15.—Skull of adult; *a*, and *b*, roots of buccal teeth of adults incline outward.

Between the buccal and lingual plates of the maxillae is to be found cancellous bone, the cavities of which are filled with nutrient vessels and marrow, or bone-building material, the ideal environment for the movement of teeth (Fig. 18).

The relation of spongy to compact bone is similar in the mandible as in the maxilla. The spicules of spongy bone are distributed according to their need and the stress brought upon the teeth which they support, being arranged in a much more dense manner in the interproximal spaces than at the apex; demonstrating, most of the anchorage is secured in the interproximal level rather than the apex of the root (Fig. 19).

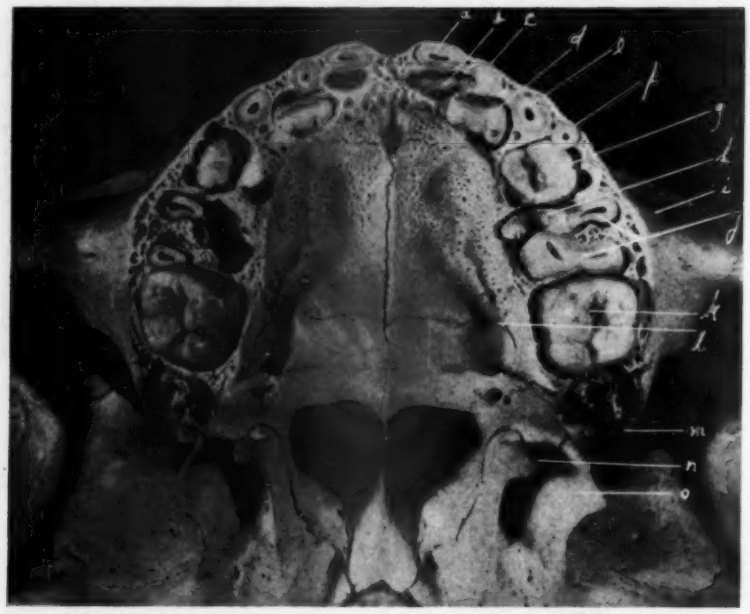


Fig. 16.—Horizontal section of skull 5½ years of age, at level of the bifurcations of roots of second deciduous molar; *a*, root of deciduous central incisor. Note, thin plate of cortical bone both to labial and lingual; *b*, incisor edge of crown of first permanent incisor; *c*, root of deciduous lateral incisor. Note, resorption occurring as result of erupting permanent central incisor; *d*, crown permanent lateral incisor. The lingual surface of the permanent lateral incisor lies nearly parallel to the roof of the mouth in this area. It overlaps the central incisor sometimes more than one-half its width; its crypt is in contact with that of the first premolar; *e*, the root of the deciduous canine. The crown of the permanent canine lies in the triangular space above the lingual surface of this root; *f*, is the mesiobuccal root of the first deciduous molar; *g*, first premolar; *h*, crown of second premolar. Note the distance this crown lies inward from the outer cortical plate of bone; *i*, key ridge; *j*, roots of second deciduous molar; *k*, crown of first permanent molar; *l*, transverse palatine suture. The second deciduous molar is opposite this suture at birth, the second permanent molar being opposite suture at age of 21; *m*, calcifying crown of second permanent molar which is situated entirely lateral to the buttress formed by the pterygoid plates; when full growth is attained the tuberosity will lie directly in front of the buttress formed by the pterygoid plates; *n*, hamular process of the sphenoid bone; *o*, is the lateral wing of the pterygoid process of the sphenoid bone.

Lateral growth of the face is illustrated in Figs. 20 and 21. In various animals the strongest teeth or the ones which do the greatest amount of work are supported accordingly with heavy dense bone. From the largest molar forward, the space between the lingual and labial plate of bone gradually diminishes (Fig. 22).

In the human, the first permanent molars, being the largest, have three roots, the other teeth one root. The buccal and lingual plates of the maxilla are separated sufficiently to contain these three-rooted molars, but anterior to them these plates are only sufficiently separated to accommodate single-rooted

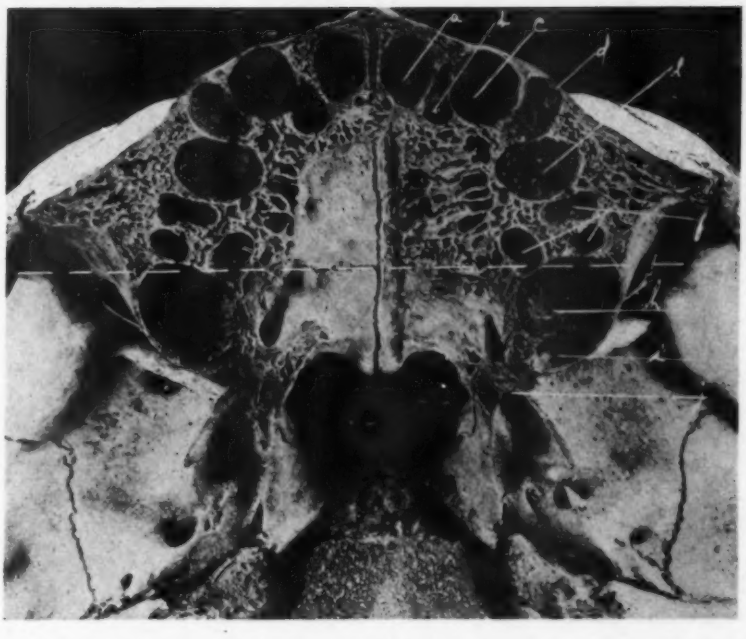


Fig. 17.—Similar section of specimen approximately 7 years of age. The cut being made near the level of the roof of the mouth. Note distribution of cancellous bone is abundant both buccal and lingual of the second premolar and first permanent molar and roof of mouth; *a*, location of first permanent central incisor; *b*, lateral incisor; *c*, canine; *d*, first premolar; *e*, second premolar; *f*, first permanent molar; *g*, transverse palatine suture is now between the first and second permanent molar; *h*, location of second permanent molar; *i*, crypt of developing third molar; *j*, the pterygoid plates.

Fig. 18.—Section similar to Figs. 16 and 17, cut being made about cemento-enamel junction of molar teeth. This specimen being approximately 21 years of age; *a* and *b*, and *c*, roots of anterior teeth; *d* and *e*, of the premolar teeth; *f*, the key ridge; *g*, three roots of first permanent molar; *h*, the transverse palatine suture opposite center of the second permanent molar; *i*, buttress of the pterygoid plates directly behind and supporting the dental arch. The tuberosity in younger specimens is not so supported, but lies lateral to this buttress, see Figs. 16 and 17.

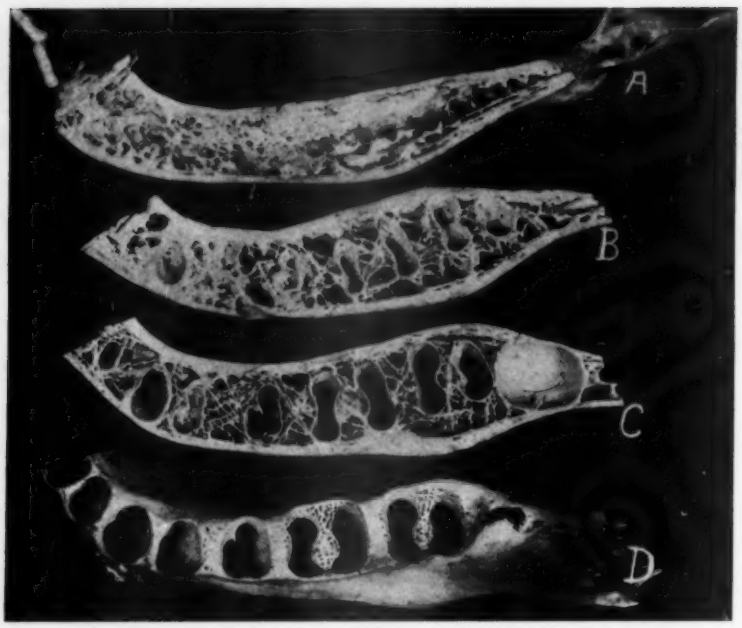


Fig. 19.—Horizontal section through mandible approximately 14 years of age. The least amount of bone supporting the mandibular teeth is in the neighborhood of the apex. The spicules become more dense as the crown is approached. The greatest amount being in the interproximal space just below the gums, *D*, decreasing toward the apex as may be followed from *D* toward *A*, the least amount being about the apices of the roots, *B*.

Fig. 20.—Skull approximately eight years of age. The four incisors and first permanent molars in each arch have erupted and are in function. The cranium is advancing toward its adult size at a faster rate than has the facial portion of the skull. The crowns of the permanent teeth must remain in contact. Their basal support, being the maxilla and mandible, will undergo considerable development as age proceeds. The juvenile face being much smaller than that of the adult. The buccal teeth, therefore, will be in a vertical position in the juvenile, but as the face widens, the apices of the roots follow this development and in the adult the inclination of the roots of the buccal teeth is outward.

Fig. 21.—In the adult, as the basal portion of each jaw grows, the apices of the roots are carried laterally while the contact points of the crowns remain in apposition. The adult occlusion has the roots of the teeth torqued outward, harmonizing with the broadened face, while in the juvenile these teeth are in a vertical direction, which is necessary to be contained in the small face.

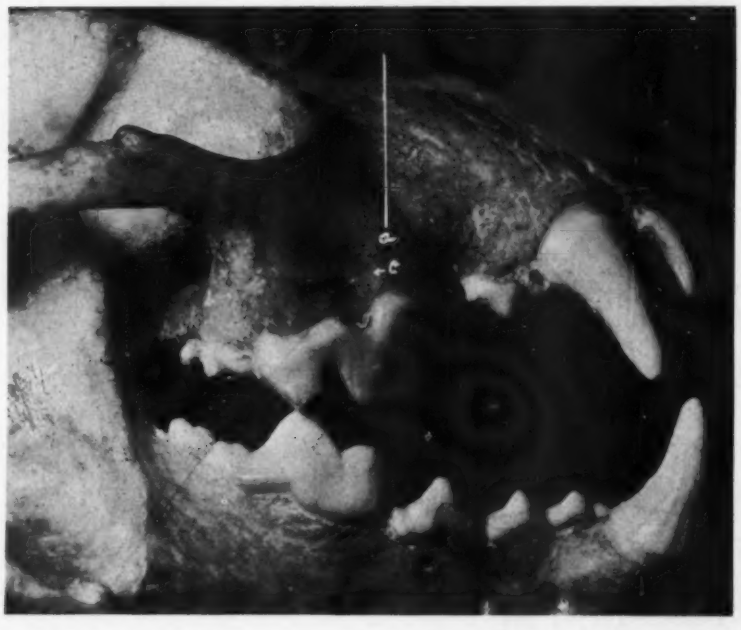


Fig. 22.—The largest molar teeth in mammals are supported by a strong buttress of bone, extending from the molar teeth up to the malar bone. The greater the discrepancy in size between the largest molar tooth and the premolars, the deeper will be the canine fossa. This produces a ridge of bone as at *a*, covering the mesiobuccal root of the molar at *c;* the area between *c* and *b*, being the jugal buttress, while the ridge of bone covering the mesiobuccal root as *a-c*, is known as the key ridge, which ridge will remain even though the molar is extracted or changes position in the jaw. For these reasons, this ridge, known as the key ridge, is used as a reliable landmark in diagnosis.

teeth. Where this line of demarcation occurs, there is a sharp depression known as the canine fossae, the distal border of which consists of a heavy ridge of bone descending from the zygoma to the maxilla and is known as the key ridge. The key ridge limits the most favorable anterior placement of the three-rooted maxillary permanent molar tooth in the adult human regardless of race or type. The maxillary permanent molar begins development in the tuberosity of the maxilla approaching the key ridge with increasing age and development of the second and third molars. When these teeth erupt, the first molar is then found to have its mesiobuccal root under the key ridge where it should remain.

Fig. 23.—Transverse section of maxilla at apical third of the molar roots. The area of cancellous bone between the lingual and buccal plates from the key ridge to the tuberosity, *a-c*, has ample width for three-rooted molars. The buccal plate dips sharply inward and forward from the key ridge, *a*, to form the canine fossa, materially diminishing the space between the labial and lingual cortical plates. This dipping inward of the buccal plate limits the normal forward drift of the molar teeth. The converging of the labial and buccal plates continues to the midline; here they are separated by only three or four millimeters. Note: The tuberosity and the apical base are supported by a buttress of bone, principally the two pterygoid plates of the sphenoid bone.

In treating cases such as we are called upon to report, it is our practice to obtain the maximum desired anchorage in the mandible and select appliances for the maxillary arch which will permit the distal movement of one, and occasionally two maxillary teeth at a time, being very careful to keep these teeth between the lingual and buccal plates of bone. The patient should discontinue the pernicious habit of resting their chin in their hands or allowing any extraneous force to bear upon the face, especially during the hours of sleep. As natural growth forces are depended upon in our plan of treatment, every precaution should be taken to prevent any interference with the full unhampered influences of such forces.

CASE REPORT

The case selected falls exactly under the classification and fulfills all the requirements of the Program Committee.

History and Attributed Etiology.—A girl, 8 years of age (Fig. 24), daughter of parents of poor health. Father died shortly after the daughter was born. Mother died nine years after of tuberculosis. Girl in poor health, underweight, with decided predisposition to tuberculosis. Posture poor, slight anterior posterior curvature of spine, flat chest, muscles of poor tonicity. Tonsils and adenoids removed, mouth breathing persisted. Normal number of teeth present and of only fair quality. Soft tissues, tender, lacking tone. Habitual sleeping on abdomen with cheek resting on hand. Habitual leaning habit at every opportunity during waking hours.

Differential Diagnosis.—Bimaxillary alveolar contraction, severe. Symmetric protraction and abstraction of maxillary incisors. Mandibular retraction, marked underdevelopment of both body and ramus, symmetric attraction of mandibular incisors.

Treatment.—As near stationary anchorage as possible was secured in the mandibular arch. Bands were placed on the first and second deciduous molars with attachments for both lingual and labial arches, both these molars being attached to each arch with stationary anchorage attachments. The first permanent molar was not banded at this time as the roots were in the formative stage. The anterior teeth were banded and universal brackets used.

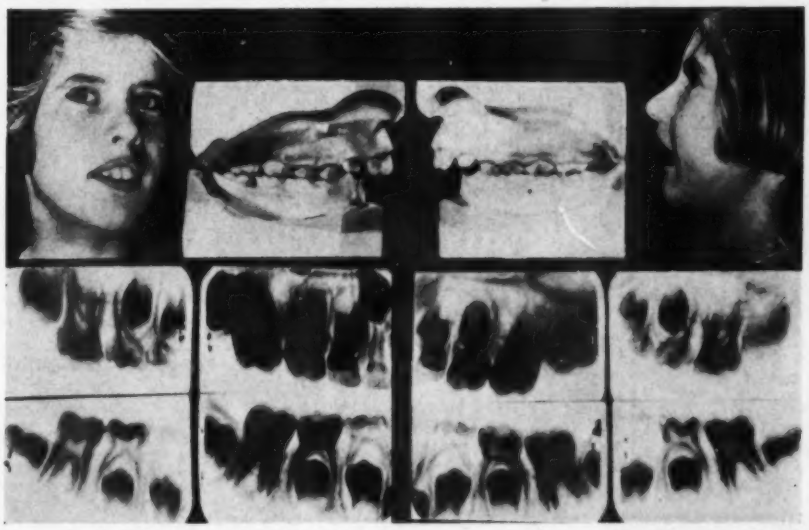


Fig. 24.—Before treatment.

Mandibular Appliance.—The lingual wire was of 0.36 inch diameter, contacting the lingual surfaces of all mandibular teeth, no auxiliary springs used. Two labial arches were employed, one in each opening of the universal bracket. In the gingival opening was placed a wire of 0.15 diameter, and in the incisal opening a flat wire 0.012 by 0.028 cross section. All wires were made as passive as possible, and the appliance assembled to secure as nearly as possible stationary anchorage.

Maxillary Appliance.—Bands were placed on the maxillary first and second deciduous molars with similar attachments as on the mandibular ones and for the present universal brackets were placed on the central incisors. A lingual arch of 0.30 inch diameter was fitted to the maxillary teeth, being

attached as on the mandible to the first and second deciduous molars with an extension to the lingual of the maxillary first molars. Labial arches were placed as in the mandible with the addition of a sliding yoke as used by Case many years ago.

Intermaxillary elastics of very mild force were employed from the distal of mandibular labial arch to the anterior end of the sliding yoke of the maxillary appliance. This placed the entire force of the elastic on the maxillary second deciduous molar and first permanent molar; the reaction being absorbed by the entire mandible.

Had this patient not overcome the habit of leaning on the chin, the hand pressure would have inhibited the natural forward growth of the body of this bone and the elastics would then have caused the mandibular teeth to drift forward on the body of this member; whereas, if this habit is actually overcome, stationary anchorage in the mandible is apparently sufficient to cause no noticeable drifting of the mandibular teeth, provided: first, care is used in selecting the proper strength of elastic, second, the maxillary tooth roots be kept in cancellous bone, third, cuspal interference eliminated, and other principles taken advantage of, which can be recognized by a study of the illustrations.

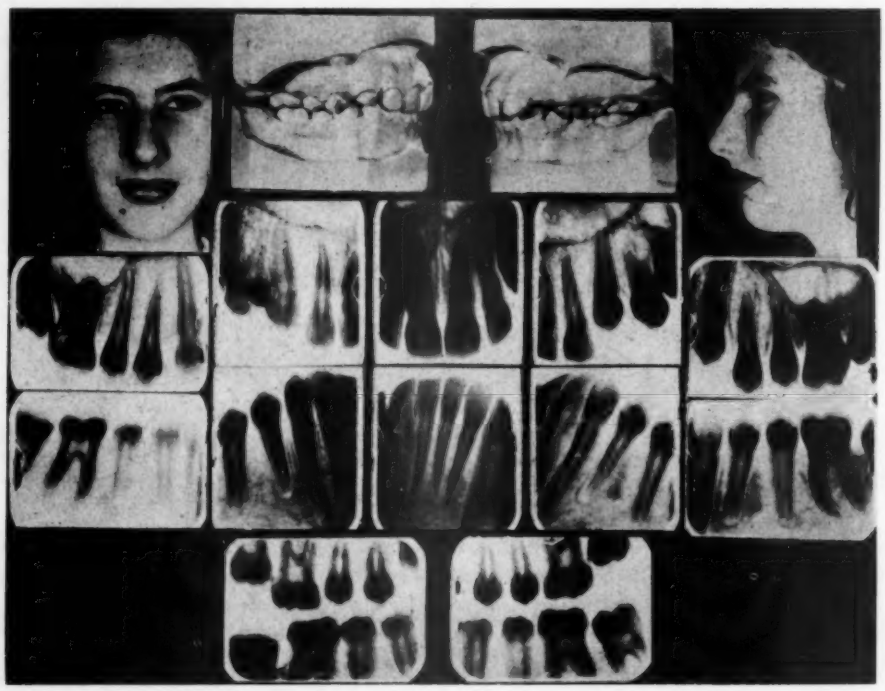


Fig. 25.—After first period of treatment and rest period.

Cases such as this should be treated in two stages: First period, as has been long advocated by McCoy and others, to get the teeth into as near normal function as possible, then give the dentures a period of rest. Second period, as permanent teeth erupt, guide them into proper occlusion. This case has finished the first and rest period and is now ready for the final phase of treatment (Fig. 25).

THE TREATMENT OF A CLASS II, DIVISION 1 CASE USING THE TWIN-WIRE MECHANISM

JOSEPH E. JOHNSON, D.D.S., LOUISVILLE, KY.

YOU have heard so much on the treatment of distoclusion by the previous members of the symposium that it now seems almost impossible to give anything new regarding it. However, after listening to the various papers upon the treatment of this type of malocclusion, I believe it is possible to present to you some ideas on treatment which differ somewhat from the usual procedure.

I found in my method of predetermining tooth movements with amalgam models that, in a bilateral distoclusion (Fig. 1), if we endeavored to move the teeth in the mandibular arch forward, until the first molars are in normal anteroposterior relation with the maxillary molars, we were obliged to do a tremendous amount of tooth movement (Fig. 2). And even if we were able to accomplish this movement, we would find we had moved the anterior teeth off the mandibular ridge, and, therefore, it would be extremely difficult to retain them (Figs. 3 and 4).

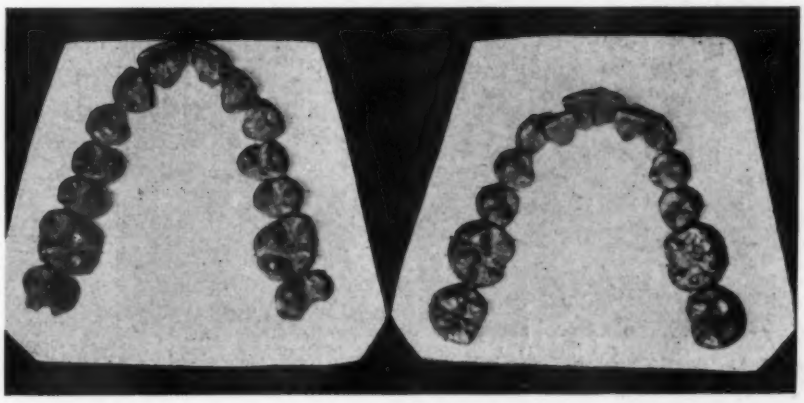


Fig. 1.

Furthermore the facial results were frequently not as pleasing as we had hoped for (Fig. 5). I also discovered, with the amalgam models, if I moved the teeth in the maxillary arch posteriorly (Fig. 6), that it was unnecessary to move the mandibular teeth so far forward and that the arches did not need to be widened as much. I also found that cases worked by this method were much easier to retain and that the facial results were much better (Fig. 7).

Fig. 8 show the models of a girl, 10 years of age, who was worked by this method. From Fig. 8 you can see: first both dental arches are narrower than normal; second, protruding maxillary incisors, with all of the mandibular teeth occupying a posterior malrelationship to the maxillary with the mandibular

Read before the American Association of Orthodontists and the Inter-American Orthodontic Congress, New Orleans, La., March, 1942.

structures markedly arrested in development; third, bimaxillary supraversion of the incisors, with the lowers in contact with the upper gingival tissues.

This case was treated with the twin-wire mechanism on the maxillary arch. Expansion of both the maxillary and mandibular arches was obtained with

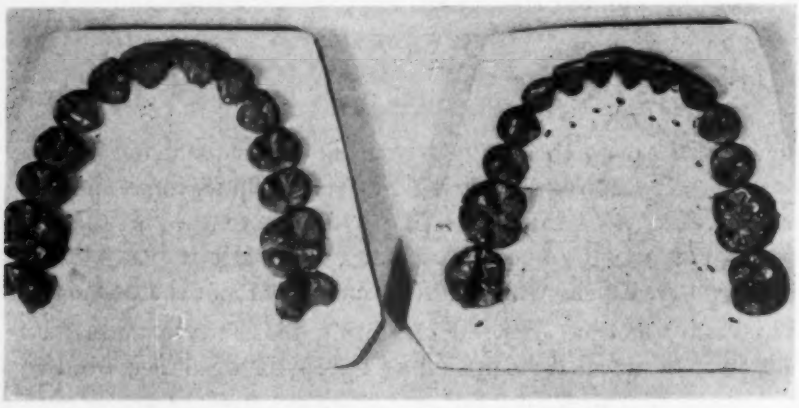


Fig. 2.

Fig. 3.

Fig. 4.

tubular lingual arches. Intermaxillary elastics were worn for nine months. At the end of ten months the appliances were removed and a Hawley retaining plate was placed on the maxillary arch, and a soldered lingual appliance was cemented on the lower to hold the expansion.

Fig. 9 shows models of the case two years later when all retention was discarded and Fig. 10 oral photographs of this case after a lapse of another two years.

Fig. 11 shows photographs of the girl; the left view was made at the beginning of treatment. The right was made five years later.

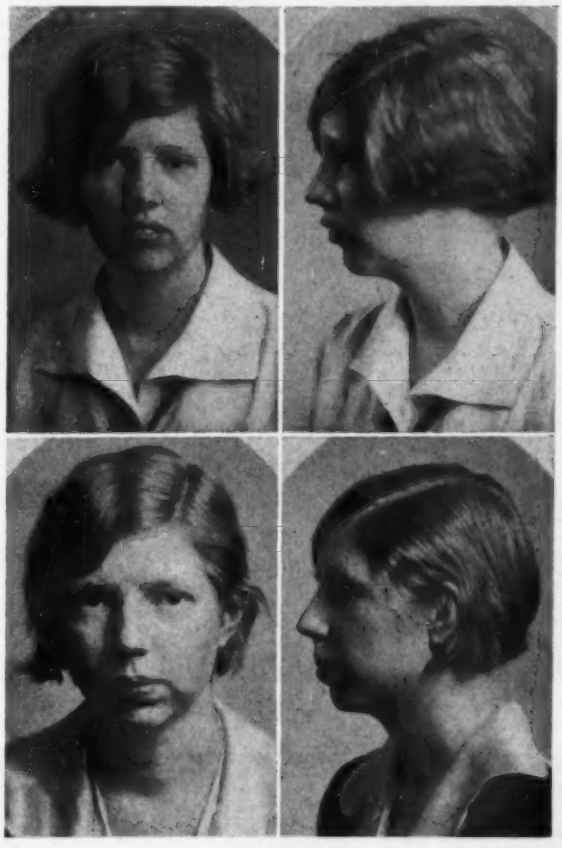


Fig. 5.

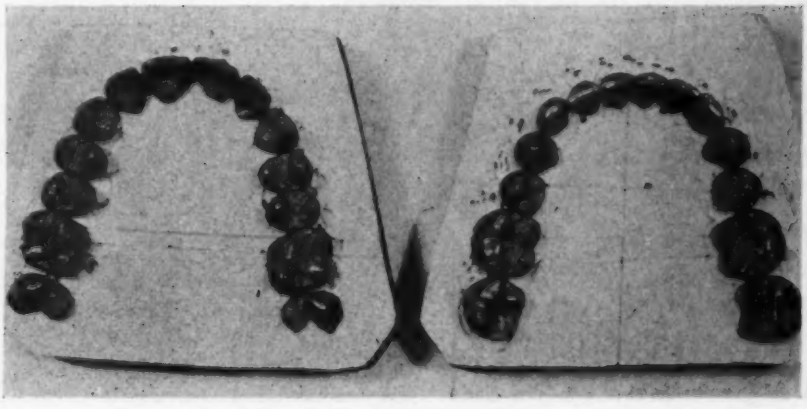


Fig. 6.

Fig. 7.

Fig. 8.

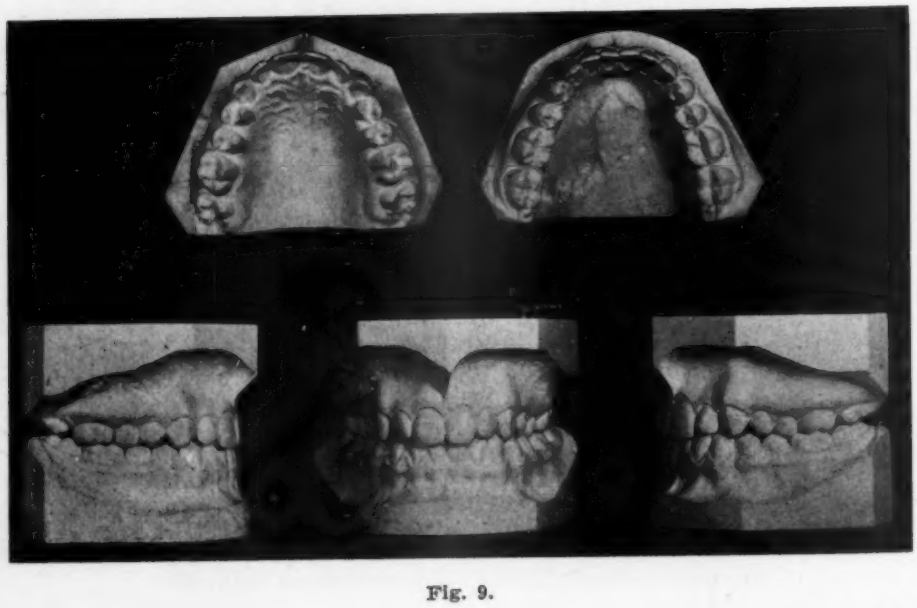


Fig. 9.

The case just shown was worked before I had begun to take Kodachrome pictures of my cases during treatment. I shall now present a similar case (Fig. 12), of which I have taken photographs at definite intervals showing the different steps of treatment. This case has not yet passed entirely through its retention period and for that reason I show you the previous case so as to comply with the condition of the symposium.

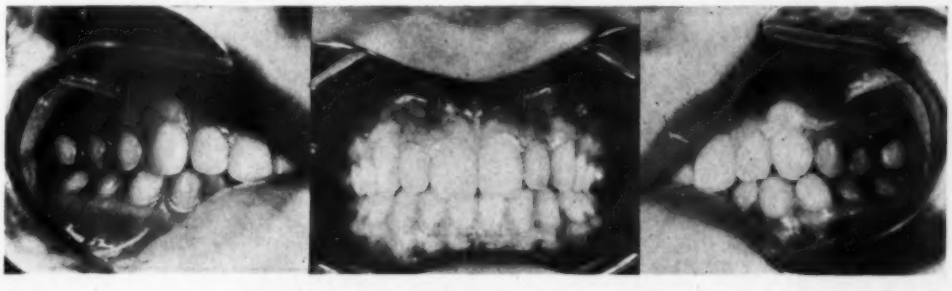


Fig. 10.

Fig. 11.

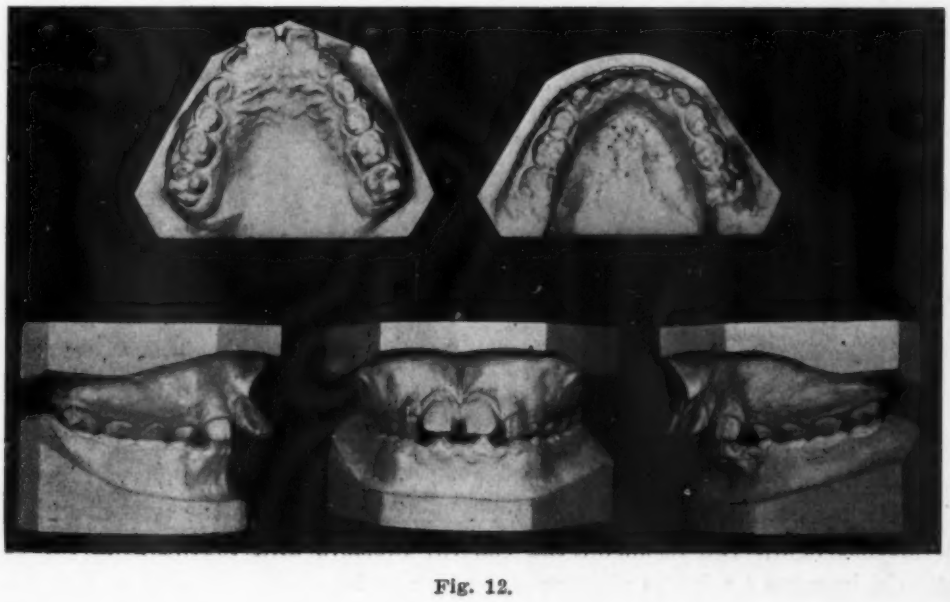


Fig. 12.

Fig. 13*A* is a lingual view of the maxillary arch. You will notice that I have a tubular lingual arch to gain expansion and that the four incisors are banded with bands $\frac{3}{32}$ of an inch in width. The buccal tubes are soldered to the molar bands so that the twin-arch lies in a single plane, Fig. 13*B*. When the maxillary

Fig. 13.

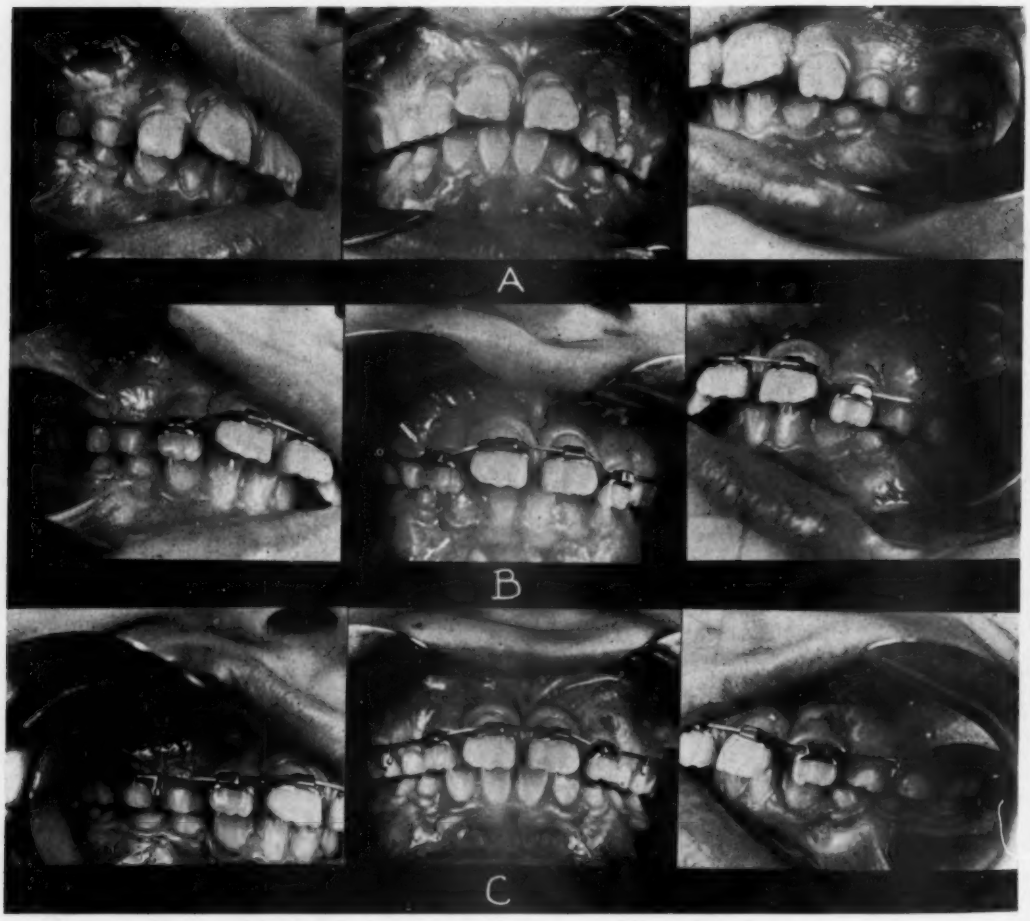


Fig. 14.

incisors are in bad supraversion, the tubes are soldered so that the twin-arch lies to the gingival of the locks. However, in this case, I diagnosed it as a lack of vertical growth in the mandibular region, and therefore the twin-arch is made to lie just below the locks on the central incisors and to the gingival of the laterals, because I wish to shorten the latter teeth.

Where expansion is needed, the buccal tubes are also soldered to the molar bands so that the twin-arch lies away from the premolar and canine teeth, thereby permitting expansion of the maxillary arch. In the mandibular arch I have placed a tubular lingual arch for expansion. The next illustration, Fig. 14*B*, shows the front and side views of the twin-wire alignment arch locked into position. Since I do not start my cases wearing elastics immediately after the appliance is placed on the teeth, I do not place hooks on the arch at this time because they would only cause the child annoyance.

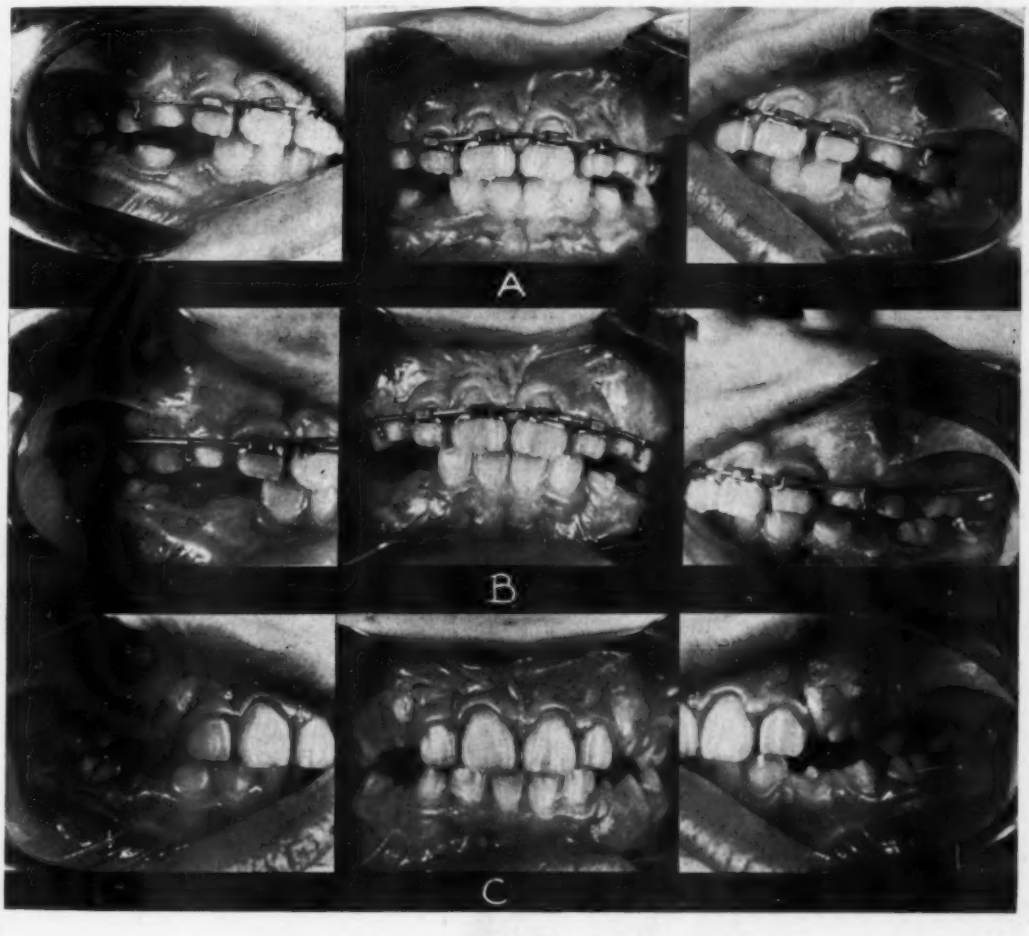


Fig. 15.

After two or three weeks this twin-wire alignment arch is removed and one with hooks is substituted, as shown in Fig. 14*C*. At the beginning of treatment the hooks are usually placed between the cuspids and the first bicuspids or the deciduous first molars, and an intermaxillary rubber with a three-ounce pull is given the child. The position of the hooks depends on the length of the mid-section of the twin arch. As the case is worked, the hooks are brought farther forward so as to exert more pull, but never farther forward than the middle of the cuspid.

The photographs in Fig. 15*A* were made four months after the ones in Fig. 14*B*. Notice how the lateral incisors have been depressed and the bite has been

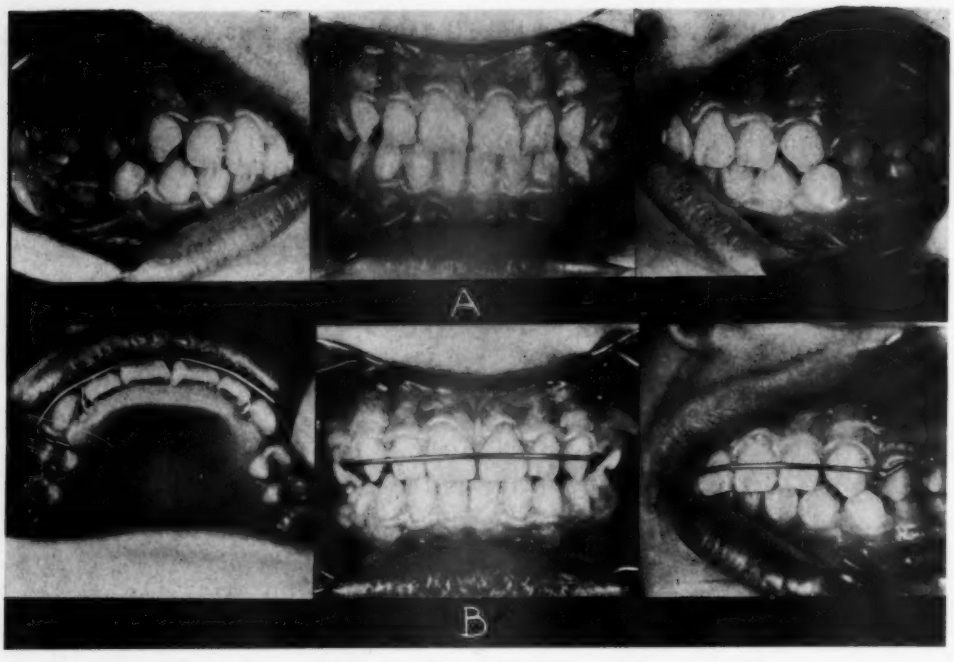


Fig. 16.

Fig. 17.

Fig. 18.

opened. Also notice that the maxillary anterior teeth have been drawn posterior until the lingual surfaces are in contact with the mandibular incisors, and that I have an almost normal anteroposterior relation of the arches. At this time coil springs were placed over the end tubes and the maxillary molars moved posterior about $\frac{1}{16}$ of an inch, as shown in the next series of photographs, Fig. 15*B*, which were taken four months later. You can see that the spaces between the anterior teeth have been closed and that the incisors have been retruded still farther, also that the molars have been elongated, as shown by the side views.

The next photographs, Fig. 15*C*, show this case after a year of treatment. Notice how the bite has been opened still farther and the maxillary laterals shortened; also the molars have been moved about $\frac{1}{16}$ of an inch farther posteriorly than necessary. At this period of treatment all appliances were removed, and a Hawley plate was substituted in the maxillary arch (Fig. 16*B*). Since we had done some expansion in the mandibular arch, the tubular arch was removed and a soldered lingual arch was made to replace it.

The views in Fig. 16*A* were made one year later. As you can see, the anteroposterior relation of the arches has been maintained; also the bite has remained normal. Because the bicuspids have been slow in erupting, I have continued to hold the molars farther posterior than normal.

Just after these pictures were taken I began trimming the acrylic plate to let the molars slide forward into normal anteroposterior relation.

Fig. 17 shows photographs of the boy at the beginning of treatment. The views in Fig. 18 were made two years later.

Department of Orthodontic Abstracts and Reviews

Edited by

DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City.

Care of Face and Jaw Casualties in the United States Army: By Leigh C. Fairbank. *War Medicine* **2**: 223-229, March, 1942.

Army medical service today has been greatly affected by the experiences of the first World War, the recommendations of contemporary medical observers, and the startling changes in modern warfare. Soldiers injured in battle today are evacuated from the battalion aid stations to the division clearing station by personnel from the collecting station and by ambulance. The application of new dressings if indicated, the institution of more secure measures for the control of hemorrhage, and other necessary emergency procedures, including urgent surgical intervention to save life, may be accomplished at each of these field installations before the transfer of the wounded to hospitals farther to the rear. When the engagement is particularly severe and the casualties increase beyond the facilities of the division medical service, surgical and evacuation hospitals are directed to move to designated points to assist in the care of the wounded. Those injured persons who can travel safely by ambulance or hospital train are transported to general hospitals far to the rear of the combat zone. The nontransportable patients are given the necessary surgical care and transferred later, when their conditions will permit.

The facilities for the care of face and jaw casualties are limited in the foremost medical installations but increase as the patients move rearward to medical units which are larger and more completely serviced. The personnel, however, in each battalion aid station and every other type of medical installation in the division receive thorough training in first-aid treatment for maxillofacial wounds. Such treatment provides for the arrest of hemorrhage, removal of foreign bodies from the mouth and throat, establishment of an adequate respiratory airway, application of dressings and bandages for the approximation and control of displaced soft tissues and bone fragments and, finally, for the safe transportation of the patient by litter and/or ambulance to the rear.

At least one medical officer and one dental officer with each surgical and evacuation hospital receive more comprehensive training for the care of face and jaw casualties. If a large number of soldiers with injuries of the face and jaw are reaching the clearing station and the supporting surgical hospital, teams for maxillofacial surgery are available from the auxiliary surgical group, under control of the army surgeon. The training program for all medical personnel concerned with the care of maxillofacial casualties has been established with the

assistance of the Subcommittee on Plastic and Maxillofacial Surgery, formed by the Division of Medical Sciences of the National Research Council.

It is not anticipated that reconstructive surgical procedures will be attempted in the combat zone, but conservative débridement, replacement of displaced soft tissues, ligation, temporary fixation of bone fragments and the retention of bone segments with periosteal attachment are all vital in this early care of face and jaw casualties.

It has long been recognized that oral and plastic surgeons and dental specialists should receive special training relative to the specific problems of war surgery. To plan effectively for such training, the Subcommittee on Plastic and Maxillofacial Surgery prepared a manual at the direction of the Surgeon General and under the auspices of the National Research Council. It is not only a training manual but a manual of practice. The subcommittee has also recommended a ninety-day training course for the medical and dental personnel to be assigned to general hospitals for the surgical reconstruction and dental restoration of patients with face and jaw injuries. Authority has been secured and funds have been made available for research in surgical prosthesis, in order to provide the most advanced training program for prosthetists and prosthetic technicians for the development of this important supportive service.

In the training program medical and dental officers for the maxillofacial teams pursue the same special course. The training of dental personnel in the various phases of oral and plastic surgery is solely to provide a broad understanding of the problems in this field and to assure the full employment of the many aids which the dental surgeon and the supportive dental agencies can provide.

Blood Pressure Observation on Children in Private Practice: By Charles G. Kerley and Edward J. Lorence, *J. Pediat.* **20**: 383-385, March, 1942.

This study comprises 4,492 blood pressure determinations on 1,469 young people from 3 to 19 years of age. Patients with acute illness or temperature elevation were not included.

It has been claimed by careful clinicians that elevated blood pressure may precede demonstrable kidney disease by several months. In these cases, blood pressure was found elevated only when a diseased kidney was proved. It is reasonable to suppose that the thyroid gland with its manifold functions in the young could be subject to disorders of a temporary as well as a persistent nature.

Hypertension in association with tachycardia, tremor, tantrums, and other evidences of nerve imbalance is not infrequently found dependent upon a so-called hyperthyroidism. In like manner hypothyroidism often will be made apparent by hypotension associated with a minus basal metabolic rate and brachycardia. Either habitually high or low blood pressure in the child strongly suggests the necessity for a study relating to thyroid gland function.

Essential hypertension of undetermined origin is of rare occurrence in children. Comparatively few cases have been reported in medical literature. An analysis of 253 cases with elevated blood pressure reveals the following:

In 187 the blood pressure was persistently subnormal.

97 varying types of malnutrition, anorexia, loss in weight, absence of gain in weight and statural growth were the outstanding complaints. There was one case of anorexia nervosa (Simmond's disease) in a girl 14 years of age.

90 were proved hypothyroid, including cretins and other forms of thyroid gland deficiencies.

This group was proved hypothyroid by response to the therapeutic test of desiccated thyroid therapy. Of 1,469 cases 1,029 group themselves with the normal blood pressure for age.

This study emphasizes that every child after the third year should have a complete physical examination at least every six months, which is not complete without a careful blood pressure determination.

Pathogenesis of Mixed Tumors of the Salivary Gland Type: By L. H. Hempelmann, and N. A. Womack, *Ann. Surg.* **116**: 34-42, July, 1942.

The fundamental structure of mixed tumors of the salivary gland type is still a controversial matter. Hoepful has classified the theories of mixed tumors under these groups:

1. All of the theories assuming that the parenchyma is mesenchymal in origin.

2. All of the theories which regard the parenchyma as being derived from the epithelium.

3. A small group of theories which proposes the parenchyma possesses epithelial as well as endothelial components.

The authors discuss and illustrate the difficulties of morphologic study of this type of neoplasm. They then present a method by which, with special staining techniques, mesenchymal mucus can be differentiated from epithelial mucus. Both of these substances are found to be present in mixed tumors of the parotid gland. Because of these findings it is suggested that the two tissue components are represented in these tumors, and that the tumors are, therefore, really mixed tumors.

The work of Hempelmann and Womack further suggests that the origin of these tumors might best be explained on the basis of embryonic alteration in tissue relationship, in accordance with the "organizer" theory of Spemann.

Harry A. Salzmann, M.D.

The Electron Microscope: By E. F. Burton and W. H. Kohl, Pp. 233, Illustrated, New York, 1942, Reinhold Publishing Company.

This book presents a comprehensive study of the physical principles in optics, electron-physics, the various light theories, and an introduction to the discussion of the electron microscope itself. The history of the electron microscope is a comparatively short one. In 1900, Sir William Rowan Hamilton, to quote the authors, ". . . had clearly shown that a striking analogy exists between the law that governs the movement of a corpuscle through a given field of force and the law which governs the trajectory of a light beam through a series of media of different refractive indices." This was the corpuscular interpretation of the electron. When the electron was finally recognized as a definite mass,

and it was ascertained that it behaved in the manner Hamilton had described, the science of geometrical electron optics was developed.

Among the important scientific contributors were Louis de Broglie, who postulated the mathematical theory behind the establishment of the dual behavior of the electron, W. Elsasser, who gave experimental evidence to support de Broglie, C. J. Davisson and C. J. Calbick, who derived the formula for the focal length of a circular and split aperture. With the work of other physicists pointing the way, E. Brüche and H. Johannson produced the first electron image in 1932. The work of the authors and other men at the McLennan laboratory in Toronto is in itself noteworthy.

The electron microscope is of two distinct types: the electrostatic electron microscope, and the magnetic electron microscope. The main difference between the two is that the electrostatic microscope has to do with self-emitting objects which serve as cathodes while the magnetic electron microscope deals with an electron beam from a given source which is used to magnify an independent object. The magnetic compound electron microscope is the one in most use today. The techniques involved in the use of both microscopes are discussed in general, and many shortcomings which still have to be overcome are enumerated.

The accomplishments of the instrument are well nigh astounding. It has well transcended the limits of the best extant light microscopes. If we observe but two of the many excellent photographs, we wonder at the fact that the diphtheroid bacillus can be magnified ×36,300 and the smallpox virus can be magnified ×113,400. Probably the most important use to which the microscope has been put is the investigation of diseases caused by viruses of the highly filtrable group. This research on viruses is still in the elementary stage. The illustrations are well made and exceptionally simple to understand. The book is well indexed.

Jerome W. Salzmann.

Discussion on the Reading of Scientific Papers. Audience Enemies Numbers I to VI: By Eugene F. Dubois, *Science* **95**: 273-274, May, 1942.

A few years ago a large international congress was held in one of the most beautiful cities of Europe. Each platform was provided with a two-foot clock that not only pointed out the elapsed time but also turned on a red light at eight minutes and a big flashing light at ten minutes. One hour after the opening, members realized that the distinguished chairmen of the sections were not holding the speakers to the ten-minute limit so carefully stipulated in the programs. Therefore, every speaker counted on talking fifteen or twenty minutes. Of course, he saved his most important slides until the end and they were shown in competition with the flashing light plus an obviously nervous chairman.

In addition, most of the speakers mumbled their words or else turned and lectured to the lantern screen. This was particularly annoying, since the papers were delivered in four different languages, each with its local variants. Most of the lantern slides were photographs of typewritten sheets crowded with data, and few speakers were content to show less than twenty. The main points were carefully concealed until the last minutes, by which time the audience had lost all interest.

In our country most of the papers are carefully prepared and carefully delivered. There are, however, enough poorly delivered papers to warrant a discussion of what may be called "audience enemies":

1. The Mumbler, who drops his voice to emphasize important points or else talks to the lantern screen instead of to the audience.
2. The Slide Crowder, who packs his slides with typewritten data and shows too many slides.
3. The Time Ignorer, who talks beyond the limit specified in the program or justified by common courtesy.
4. The Sloppy Arranger, who jumbles his material.
5. The Lean Producer, who has poor material.
6. The Grasping Discussor, who when he gets talking stays talking.

Number 1, the Mumbler, is handicapped by poor habits of speech, an incorrectly placed voice or else an inherent nervousness. In other cases bad delivery is caused by lack of consideration in a man who is more interested in excreting words than in conveying information. When he turns to the screen and talks at the chart he is paying more attention to his own achievements than to the audience. This is particularly disastrous if he wanders away from the microphone.

Number 2, the Slide Crowder, wishes to show just as much of his data as possible and thus demonstrate his industry. He prepares many slides from typewritten sheets, because this is the easiest method. He ignores the fact that the typewriter has the worst possible type for display at a distance. If he would only have his slides drawn with India ink the very labor involved would cause him to limit his material to the essentials, and these would be legible. It is a simple matter to calculate for a ten-minute paper just how many seconds each slide will be exposed on the screen and how much can be read and understood while thus exposed. Every nonessential word or figure distracts the eye from the small fraction that is essential. A good slide needs no pointer or verbal explanation.

Number 3, the Time Ignorer, who exceeds the limit set in the program, is purely selfish or else overimpressed with the idea that his paper is much more important than the program committee had imagined. He may have planned deliberately to go overtime but more probably did not take the trouble to rehearse his paper with a watch. If he did use a watch, he forgot that it always takes several minutes longer to deliver a paper from a platform than to read it in an empty room.

Number 4, the Sloppy Arranger, selects the method of presentation best calculated to confuse the audience. Would it not be kinder to the audience if he followed newspaper technique and gave in a headline, early in the talk, some idea as to what and wherefore?

Number 5, the Lean Producer, is only relatively lean. If he has one fact to exhibit and does it modestly, he has made a contribution. If he does not recognize his paucity of material, he does more harm than good. The real audience enemy is the man whose paper consists of trivia, errata, omissia, et cetera; mostly et cetera.

Number 6, the Grasping Discussor, can spoil almost any meeting. If he has been invited to open the discussion he has probably prepared a nice little

paper of his own with scant reference to the paper of the evening. There is another type of discussor who happens to have in his pocket some lantern slides that he would just like to show for two minutes.

In the face of all these enemies the audience itself can do but little. The chairman, however, can do a great deal. Perhaps instead of chairman he should have the title of "Sole Protector of the Audience."

Ludwig's Angina: By M. Taffel, and C. Harvey, *Surgery* **11**: 841-851, June, 1942.

After a brief review of the literature which reveals that the mortality of Ludwig's angina ranges from 25 to 54 per cent, the authors present an analysis of forty-five cases. The authors aim to show that this mortality can be substantially reduced if the disease is recognized early and is treated promptly and judiciously. Only those cases in which the infectious processes are located in the areas between the mylohyoid and the geniohyoid, or between the geniohyoid and genioglossus muscles, irregardless of the point of origin or the pathway of spread, are taken into consideration.

Any infectious process whether associated with suppuration or with edema alone increases the tension within the submandibular space with consequent displacement of the only yielding bordering structures, i.e., the floor of the mouth, the tongue, and the pharynx. It is this displacement and edema which are responsible for the respiratory difficulties which characterize the disease. Because of the deep situation of the infection, fluctuation and edema of the overlying skin are not early findings. The earliest and most important clinical manifestations of infection within the submandibular space are: (1) a deep and tender swelling in the submandibular and submaxillary areas of the neck; (2) swelling of the floor of the mouth; (3) elevation of the tongue. Systemic manifestations of infection are also present. Dysphagia, hoarseness, dyspnea, pneumonia, and septicemia appear later, and one should not wait for these developments before instituting treatment or establishing a correct diagnosis.

The primary object of treatment is not only to drain pus but rather to decompress the submandibular space and to release the tension within it as early and as completely as possible. This can be accomplished only by a transverse section of the deep fascia and the mylohyoid muscle on one or both sides, depending on whether the infection is unilateral or bilateral.

The authors describe their operative technique. The text is elucidated by three diagrammatic illustrations.

Harry A. Salzmann, M.D.

Surgical Treatment of Spasmodic Facial Tic: By W. G. German, *Surgery* **11**: 912-915, June, 1942.

Howe, Tower and Duel have described the appearance of fibrillary motor overflow in the facial muscles after facial nerve regeneration following nerve section in monkeys. This type of fibrillary motor overflow is not infrequently seen following recovery from Bell's palsy.

Various operations have been used (Coleman and others) to obtain satisfactory relief from severe tonic and clonic facial spasm. Usually such relief has been attained at the cost of partial facial paralysis.

The object of treatment of facial spasm is to obtain relief of spasm without paralysis of the face. The author's technique consists of operation under local anesthesia carried out through a vertical incision just anterior to the ear. The dissection is directed along the parotid fascia to the anterior border of the parotid gland. At this point the primary branches of the facial nerve are identified, and those branches, which upon electrical stimulation cause contraction of those muscles especially involved in the facial palsy, are isolated preparatory to partial section. In recent cases the author has made a small nerve flap, composed of three-fourths or more of each involved branch and the free proximal segment is held loosely in a reversed direction by a lightly tied suture.

Four cases are reported with illustrations.

Harry A. Salzmann, M.D.

A Textbook of Histology: By Alexander A. Maximow, Late Professor of Anatomy, University of Chicago, and William Bloom, Professor of Anatomy, University of Chicago. Fourth edition, completely revised with 562 illustrations, some in colors. Pp. 695. Philadelphia, W. B. Saunders Company, 1942.

New photographs including photomicrographs and three-dimensional drawings have been added to this edition. In addition to a detailed discussion on general histology, the authors present the histology of the teeth and investing tissues. The histology of the tongue, the mucous glands, and the mucosa and the oral cavity is discussed. Many of the newer findings on dental histology as well as illustrations from Orban and Schour are included. This work has long been a standard textbook and has now been brought up-to-date. The illustrations, including color plates, are of the highest order. This feature is of special value in a book of this type. It is noteworthy that the source for the material on the histology of the mouth and teeth has been derived from the findings of dental authors. Detailed bibliographic references have been included and a detailed index is appended.

Editorial

Excerpt of Bone Growth Report

When an investigator talks or writes about change in growing bone, the phase notwithstanding, it always secures an attentive ear from orthodontists. There is good practical reason for this interest in bone change as displayed by the orthodontist inasmuch as the success or failure of his work is dependent largely on the biologic change that takes place in bone during treatment.

Plainly there are many things that cause bone to change its structure, and one of these is the artificial stimulus applied to bone by way of the teeth through the medium of orthodontic appliances. Bone affords a resistance to the moving of teeth from one position to another; hence as a result, there is set up a highly cellular activity in order to attempt to adapt itself to the mechanical stimulation being directed on the teeth. Much has been written on this subject by our best authorities.

It is a well-known fact that for many years orthodontists have observed clinically that there is a marked and wide variation in the velocity of response of bone to the stimulus created by orthodontic appliances. It has been noted by many workers that not only is there wide variation in the degree of response in different children, but that there is equally wide variation of cellular activity within the same child at various intervals and periods during his growth span.

Health and diet and their effect on bone have been stressed, and a recent report by Charles L. Wilbar, Jr., of Honolulu, T. H., is of great interest to orthodontists. Groups of preschool age children were examined in order to ascertain information in regard to diet and its relation to the ossification of bone. According to the report that appears in the October issue of the *Journal of Pediatrics* many films were taken on 102 children over a period of three years. Exposures were taken of several views of wrists and ankles, and in addition, exposures were made of the distal ends of the long bones and the proximal ends of the metacarpals and metatarsals. These exposures were obviously made in order to check the rate of bone development in the children under observation.

The children came from several locations on the island and accordingly were segregated into groups for study. The diet was varied somewhat in each group; however, the interesting thing seems to be that all groups of preschool age children showed retarded bone development as compared with the table developed by the Harvard School of Public Health. The vitamin supply was regarded as ample in all of the groups. There was one group that proved to be the exception in which no individual in the group showed retarded osseous development. The report makes several points in regard to this one group that was the exception to the general rule of under-ossification. It says the velocity of bone development of this particular group may or may not be due to the fact that the children were of rugged Hawaiian extraction or to their diet, which had no

supervision whatsoever. They ate large quantities of poi, the favorite food of the old natives, which is made from the tuber of the taro plant and is rich in calcium, phosphorus, and vitamin B. They also ate large quantities of sea food including many opihi, a shellfish that contains as much vitamin A and D as does good cod-liver oil.

The author in his conclusions of this study comments, "(1) There is an as yet unrecognized racial or hereditary factor which has to do with bone development; or (2) standards of adequate intake of calcium, phosphorus, vitamin A and/or vitamin D should be raised; or (3) retarded osseous development is an exceptionally fine indicator of inadequacies in diet."

It is obvious that little is known as fact on the subject of diet and its relation to osseous development; however, there is one thing upon which orthodontists of experience will agree from clinical evidence, and that is that vigorous children, the outdoor athletic type, full of life and dash, are much more responsive orthodontic patients than are the opposite type. A normal or accelerated rate of bone development may have much to do with success or failure in orthodontic treatment as pointed out by some of our leading orthodontists, some years ago. One practical mind put it in simple terms when he said, "Some bone tissue responds to orthodontic treatment like a stone wall while other bone tissue reacts like potter's clay."

H. C. P.

News and Notes

Research Section, American Association of Orthodontists

At the present time there is no opportunity afforded men interested in orthodontic research to meet together and discuss their problems. At the last meeting of the American Association of Orthodontists it was proposed that the Research Committee be empowered to arrange a portion of the program for the next annual meeting.

The program will consume one-half day and will be restricted to ten- or fifteen-minute reports by men actively engaged in research in orthodontics, or in its allied fields. Time will be allowed for discussion of all presentations, in order that the greatest benefit may accrue to those participating. All institutions and all individuals are invited to request time.

For further information or time reservations on the program address communication to

ALLAN G. BRODIE, Chairman
Research Committee, A. A. O.
30 North Michigan Avenue
Chicago, Illinois

Prize Essay Contest

The Research Committee of the American Association of Orthodontists has been empowered by the Board of Directors to conduct a prize essay contest. The prize has been set at $200.00 and will be offered annually until further notice. The terms of the competition are as follows:

Eligibility.—Any student enrolled in a recognized university, or any person who has completed his or her formal education in orthodontics not more than three years prior to Jan. 1, 1943, is eligible to compete for the prize.

Essay.—The essay must represent a piece of original research having a direct bearing on the field of orthodontics. It may relate either to a biologic or clinical problem and may represent material that has been offered in partial fulfillment of the requirements of a graduate or postgraduate degree, or any graduate, postgraduate or undergraduate contest. No previously published essay will be accepted. All essays must be in the hands of the committee by Jan. 31, 1943. If no essay is deemed worthy by the committee, the prize will be withheld.

Award.—The prize-winning essay will be accorded a place on the scientific program of the annual meeting of the Association, at which time the prize will be awarded. The Association will retain publication rights on the first three choices.

For further information, address

ALLAN G. BRODIE, Chairman
Research Committee, A. A. O.
30 North Michigan Avenue
Chicago, Illinois

Pacific Coast Society Meeting Cancelled

The meeting of the Pacific Coast Society of Orthodontists, originally scheduled for February, 1943, has been cancelled.

EARL F. LUSSIER, Secretary-Treasurer

Survey of Dental Laboratory Technicians

The War Service Committee of the American Dental Association will, in the immediate future, make a complete survey of the dental laboratory technicians in America.

The following memorandum was presented to the War Service Committee on Aug. 22. It contains data obtained by a limited survey of dental laboratory technicians made by the Central Research Organization of the Certified Akers Laboratories Group and the Dental Laboratory Institute of America. This preliminary study disclosed conditions that have prompted the American Dental Association to make a more thorough survey of the dental technician field. When completed the survey will provide information that will enable authorities to supply the maximum amount of high quality dental laboratory services to the Armed Forces and to the dental profession that is serving the public.

The War Service Committee and other officers and leaders of the American Dental Association, together with government officials, after considering the data from the preliminary survey, expressed a genuine desire for constructive co-action.

On Aug. 31, a letter from Dr. C. Willard Camalier, Chairman of the War Service Committee of the American Dental Association, included the following particular passage:

"The matter of dental technicians was duly presented to the Committee on Dental Preparedness—now known as the 'War Service Committee'—on Aug. 22; was approved by that body and also recommended to the Board of Trustees; approved by that body and also by the House of Delegates. . . This survey will be made entirely at the expense of the American Dental Association."

Space will not permit the printing of the full report; however, general information disclosed by the survey of Aug. 22, 1942, is as follows:

INFORMATION DISCLOSED BY SURVEY OF AUGUST 22, 1942

1. Comparison of the number of dentists withdrawn from civilian service with technicians lost from the industry, based upon 75,000 dentists, 3,421 laboratories, and 12,320 dental technicians in the U. S. A. (All technicians working at the bench.)		
Ratio of dentists to laboratories	21.92 to 1	
Ratio of dentists to technicians (normal balance)	6.80 to 1	
Dentists now in U. S. Service	7,500	10.00%
Technicians now in U. S. Service	2,641	21.44%
Ratio of dentists to technicians in Service	2.84	
Estimated number of dentists required for Army of 6,000,000	13,700	17.75%
Number of technicians required at present ratio	4,687	38.04%
2. Distribution in Service—		
Total number of technicians now in Service	2,641	21.44%
Estimated requirement for Army of 6,000,000	4,687	38.04%
Technicians assigned to dental department in Service	919	
Percentage of total number in Service		35.00%
3. Technicians left for civilian service (all classifications)	7,633	61.96%
Ratio dentists to technicians remaining in civilian service (61,200)	8.08 to 1	
4. Number of technicians over 45		8.7%
Number of technicians legally subject to draft	11,246	91.3%
Remainder left in civilian service	984	
Ratio of dentists to technicians remaining in Service	62.8 to 1	
Note this represents an increase in load of		823.00%
Estimated present increase in dental service requirements		15.00%

New York Society of Orthodontists

The New York Society of Orthodontists held its fall meeting Nov. 9 and 10, 1942, at the Waldorf-Astoria Hotel in New York City. The following program was presented:

Case Report, "The Differential Analysis and Treatment of Two Cases of Apparent Mandibular Protraction," James Jay, D.D.S., New York, N. Y. "Traumatic Injuries," Douglas B. Parker, M.D., D.D.S., New York, N. Y. "The Role of the Orthodontist in Traumatic Injuries of Face and Jaws," Joseph D. Eby, D.D.S., New York, N. Y. "Plastic Procedures in Facial Deformities," Jerome P. Webster, M.D., New York, N. Y.

Supplementing papers were presented by Drs. Parker, Eby, Webster, and N. A. Olinger, D.D.S., Bloomfield, N. J.

Case Report was presented by Dr. Saul Knopf, M.D., New York, N. Y. "Mechanical Orthodontics, A Halfway Measure," by Alfred P. Rogers, D.D.S., Boston, Mass. "Gingival Lesions of Interest to Orthodontists," by Daniel E. Ziskin, D.D.S., New York, N. Y. "The Inclination of the Mandibular Incisors," Herbert I. Margolis, D.M.D., Boston, Mass. "Resection of the Mandible," William H. Pearson, Norfolk, Va.

American Association of Orthodontists

The next meeting of the American Association of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, Illinois, May 3, 4, 5, 6, 1943. Members of the American Dental Association are invited to attend this meeting upon the presentation of proper credentials and payment of the registration fee. Credentials should be obtained in advance from the secretary of the American Association of Orthodontists or the secretary of a constituent orthodontic society.

MAX E. ERNST, Secretary
1250 Lowry Medical Arts Bldg.
St. Paul, Minn.

Proposed Changes in the Constitutional By-Laws of the American Association of Orthodontists

The object of these proposed changes is to establish definite boundaries for the constituent societies.

1. The New York Society shall consist of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, Pennsylvania, New York, New Jersey, Delaware, Maryland, District of Columbia, and the Maritime Provinces of Canada.

2. The Southern Society shall consist of Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Kentucky, Mississippi, and Louisiana, east of the Mississippi River.

3. The Great Lakes Society shall consist of Ontario, Michigan, Ohio, and Indiana.

4. The Central Society shall consist of Illinois, Wisconsin, Minnesota, North Dakota, South Dakota, Nebraska, Iowa, and Missouri.

5. The Southwestern Society shall consist of Kansas, Oklahoma, Texas, Arkansas, and Louisiana, west of the Mississippi River.

6. The Rocky Mountain Society shall consist of Montana, Wyoming, Utah, Colorado, and New Mexico.

7. The Pacific Coast Society shall consist of California, Oregon, Washington, Arizona, Nevada, Idaho, Alaska, Hawaiian Islands, Philippine Islands, and British Columbia.

These proposed changes are to be voted on at the 1943 meeting.

MAX E. ERNST, Secretary

Notes of Interest

Dr. Leigh Cole Fairbank, Brigadier General U. S. Army Retired, announces that he has entered the exclusive practice of orthodontics at 1726 Eye Street, N. W., Washington, D. C., and the Arlington Medical Center, Arlington, Va.

Dr. P. J. Ritt announces the removal of his offices to Old National Bank Building, Room 907-908, Evansville, Ind. Practice limited to orthodontics.

Dr. W. P. Delafield wishes to announce that he is in the exclusive practice of orthodontics, Medical Arts Building, Dallas, Texas.

Dr. Dan C. Peavy announces the opening of new offices in Suite 746 Milam Building, San Antonio, Texas. Practice limited to orthodontics.

Dr. Keith L. Buechele, assistant professor of exodontia and oral surgery, St. Louis University School of Dentistry, announces that he has taken over the office of Dr. Oather A. Kelly, University Club Building, St. Louis, Mo. Practice limited to exodontia and dental oral surgery.

Dr. David Tanchester, in charge of the dental department at Montefiore Hospital, was elected secretary of its Medical Board on Oct. 28, 1942.

OFFICERS OF ORTHODONTIC SOCIETIES*

American Association of Orthodontists

President, J. A. Burrill - - - - - - - - - - - 25 East Washington St., Chicago, Ill.
Secretary-Treasurer, Max E. Ernst - - - 1250 Lowry Medical Arts Bldg., St. Paul, Minn.
Public Relations Bureau Director, Dwight Anderson
- - - - - - - - - - - - - - - - - 292 Madison Ave., New York, N. Y.

Central Association of Orthodontists

President, Harold J. Noyes - - - - - - - - - 55 E. Washington St., Chicago, Ill.
Secretary-Treasurer, L. B. Higley - - - - - - - 705 Summit Ave., Iowa City, Iowa

Great Lakes Society of Orthodontists

President, Henry D. Cossitt - - - - - - - - - - 942 Nicholas Bldg., Toledo, Ohio
Secretary-Treasurer, C. Edward Martinek - - - - - 661 Fisher Bldg., Detroit, Mich.

New York Society of Orthodontists

President, E. Santley Butler - - - - - - - - 55 Locust Ave., New Rochelle, N. Y.
Secretary-Treasurer, Norman L. Hillyer - - - - Professional Bldg., Hempstead, N. Y.

Pacific Coast Society of Orthodontists

President, Ben L. Reese - - - - - - - - - - - Roosevelt Bldg., Los Angeles, Calif.
Secretary-Treasurer, Earl F. Lussier - - - - - 450 Sutter St., San Francisco, Calif.

Rocky Mountain Society of Orthodontists

President, George H. Siersma - - - - - - - - - 1232 Republic Bldg., Denver, Colo.
Secretary-Treasurer, Curtis L. Benight - - - - - - 1001 Republic Bldg., Denver, Colo.

Southern Society of Orthodontists

President, M. Bagley Walker - - - - - - - - 618 Medical Arts Bldg., Norfolk, Va.
Secretary-Treasurer, E. C. Lunsford - - - - - - 2742 Biscayne Blvd., Miami, Fla.

Southwestern Society of Orthodontists

President, E. Forris Woodring - - - - - - - - - Medical Arts Bldg., Tulsa, Okla.
Secretary-Treasurer, R. E. Olson - - - - - - Union Nat'l Bank Bldg., Wichita, Kan.

American Board of Orthodontics

President, William E. Flesher - - - - - 806 Medical Arts Bldg., Oklahoma City, Okla.
Vice-President, Frederic T. Murlless, Jr. - - - - 43 Farmington Ave., Hartford, Conn.
Secretary, Bernard G. deVries - - - - - - - Medical Arts Bldg., Minneapolis, Minn.
Treasurer, Oliver W. White - - - - - - - 213 David Whitney Bldg., Detroit, Mich.
James D. McCoy - - - - - - - 3839 Wilshire Blvd., Los Angeles, Calif.
Joseph D. Eby - - - - - - - - - 121 E. 60th St., New York, N. Y.
Claude R. Wood - - - - - - - - Medical Arts Bldg., Knoxville, Tenn.

Harvard Society of Orthodontists

President, Harold J. Nice - - - - - - - - - 475 Commonwealth Ave., Boston, Mass.
Secretary-Treasurer, Edward I. Silver - - - - - - - 80 Boylston St., Boston, Mass.

Washington-Baltimore Society of Orthodontists

President, Kyrle W. Preis - - - - - - - - - 700 Cathedral St., Baltimore, Md.
Secretary-Treasurer, Meyer Eggnatz - - - - - - Medical Arts Bldg., Baltimore, Md.

Foreign Societies†

British Society for the Study of Orthodontics

President, S. A. Riddett
Secretary, R. Cutler
Treasurer, Harold Chapman

---

*The Journal will make changes or additions to the above list when notified by the secretary-treasurer of the various societies. In the event societies desire more complete publication of the names of officers, this will be done upon receipt of the names from the secretary-treasurer.

†The Journal will publish the names of the president and secretary-treasurer of foreign orthodontic societies if the information is sent direct to the editor, 8022 Forsythe, St. Louis, Mo., U. S. A.

CHARLES VIRGIL MOSBY